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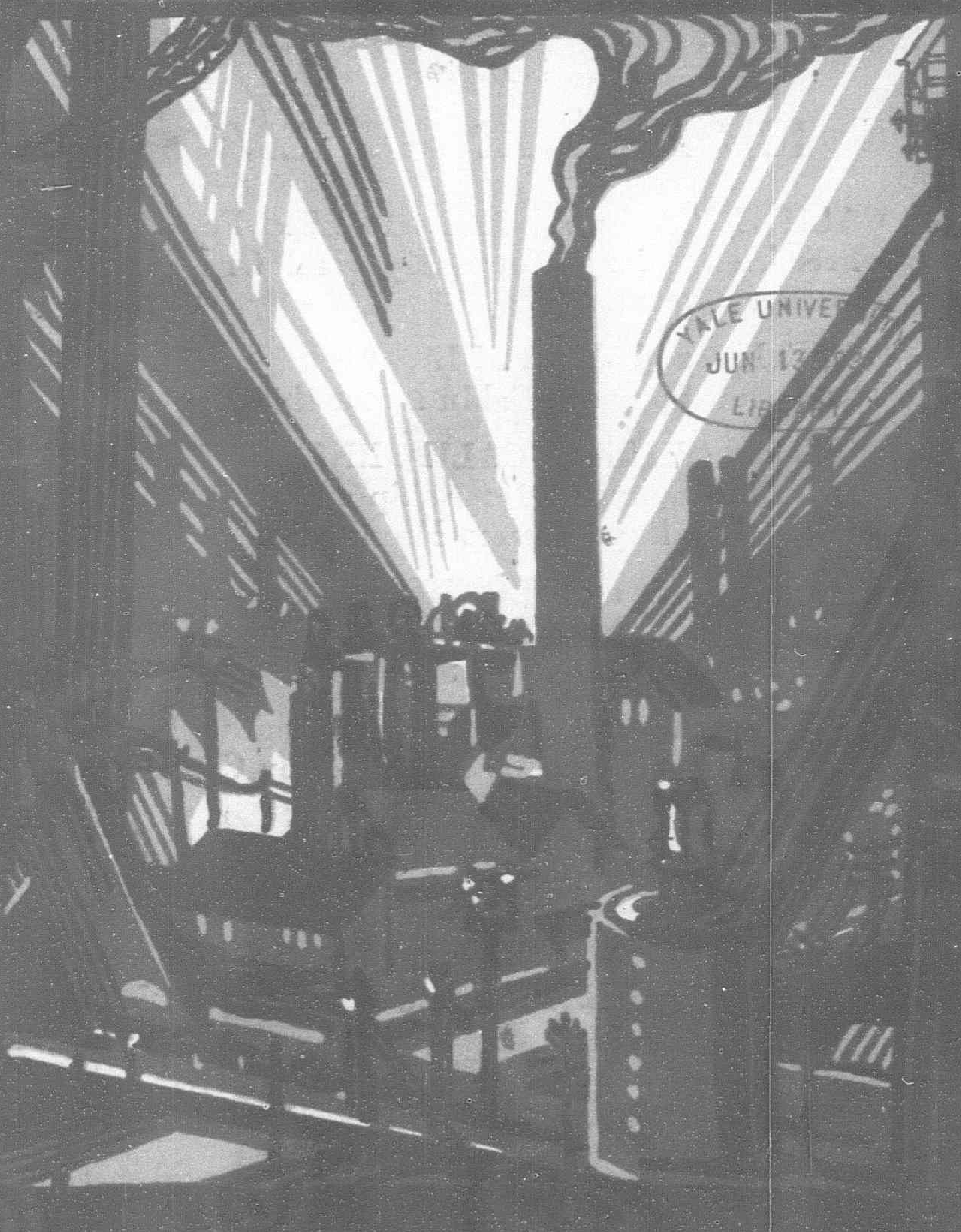

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THE RED SCOURGE IN CHINA

THE ROAD TO NATIONAL SALVATION

INTERNATIONAL BACKGROUNDS

SAY IT IN CHINESE

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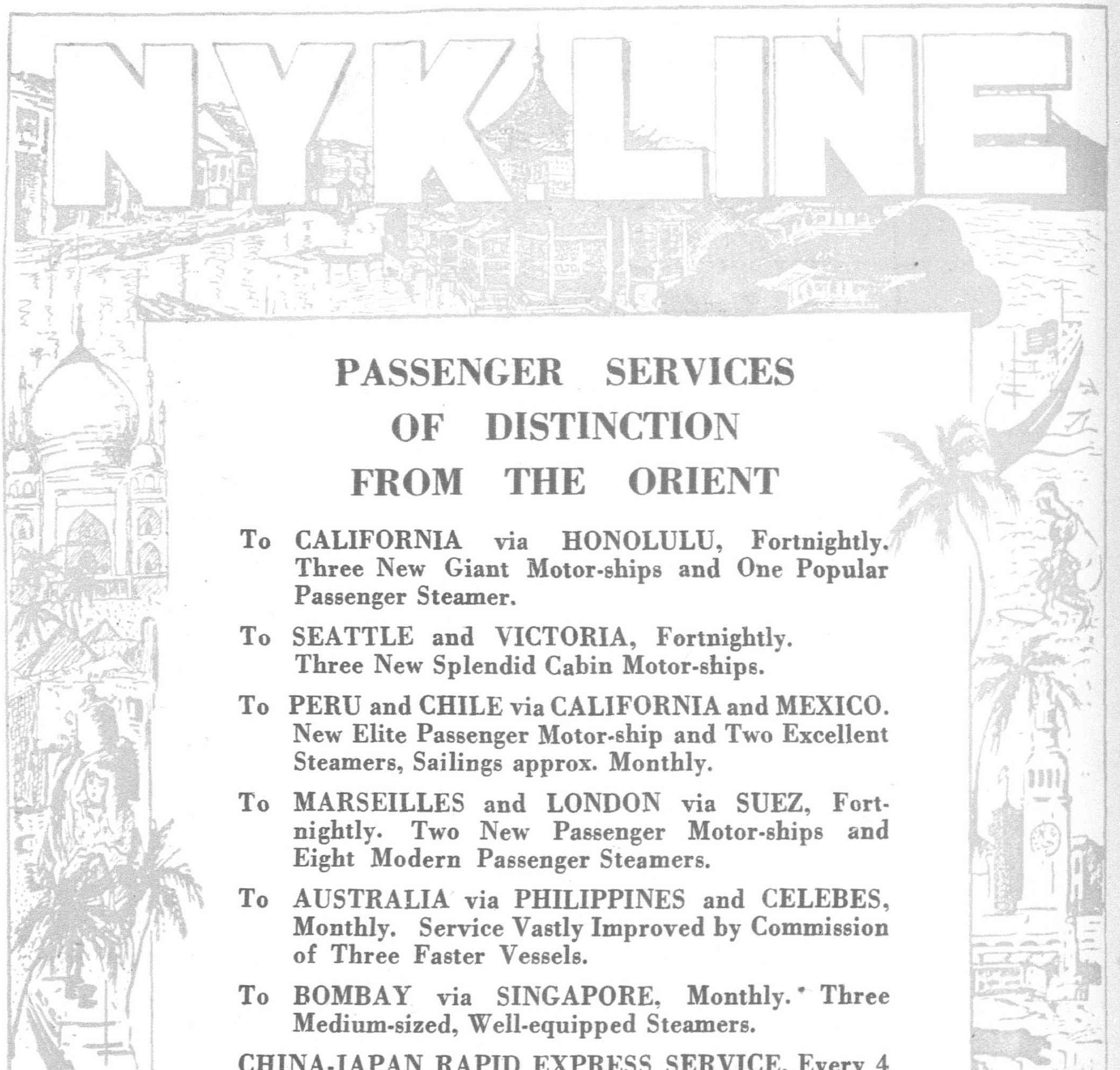

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The Far Eastern Review

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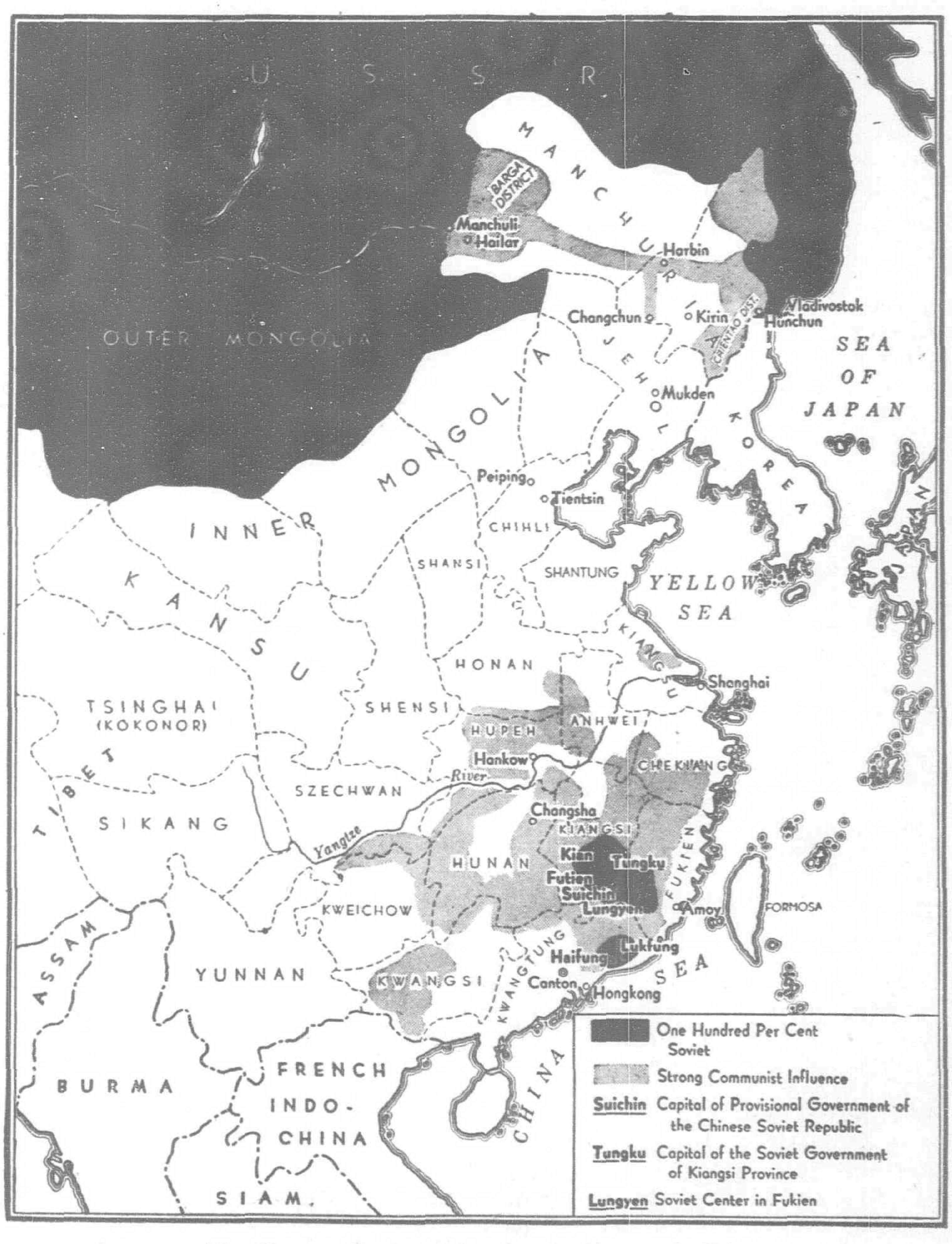
The Red Scourge in China

By O. M. GREEN, Former Editor of the "North-China Daily News," in "The Fortnightly Review"

In all the well-deserved praise of Lord Lytton's report on the Sino-Japanese conflict, one part has certainly not received the attention it demands: that is the sections dealing with the internal chaos, and especially the terrifying spread of Communism, in China. Three closely written pages—a large proportion of a report which had to cover such wide ground—are exclusively devoted to the genesis and present extent of the Red movement, and to the Government's almost insuperable difficulties in overcoming it; and it is abundantly clear from the Report and from various remarks of Lord Lytton's since he came, that no settlement in Manchuria can be satisfactory unless accompanied by settlement in China. Communism is for China the most formidable part of the task of internal reconstruction. After twenty years of experiment in every sort of administration, the final issue before China to-day is, Communism or Nationalism? And victory for the Communists would mean half Eastern Asia under the Red Flag. The West is for the most part entirely unconscious of the enormity of the danger.

Even eighteen months ago the Communist influence was largely confined to the south of the Yangtze. Recently it has extended widely to the north of the great river, particularly in the provinces of Hupeh, Anhui, Honan and Kiangsi. Altogether it is calculated that an area of 300,000 square miles containing about 90,000,000 people and some of the best land in China is, in varying degrees, dominated by the Reds. When Sir John Hope Simpson was doing his wonderful flood relief work along the Yangtze last spring, there were placards on the river bank not many miles above Hankow, indicating where the Communists' territory began, and the relief workers had to deal with them as with an independent State. Though the bulk of the Communist forces are mere bandits, the controlling mind at the back is invariably Red, and, if the Communists captured Nanking, it would make no difference that their rank and file knew nothing of Marxian doctrine.



The Communist Dominion in the Heart of China

Since last summer General Chiang Kai-shek has been campaigning with 600,000 men against the Reds north of the Yangtze, while the Minister of War, General Ho Ying-chin, has been driving at their headquarters in South Kiangsi in co-operation with the famous 19th Route Army, which did all the fighting against the Japanese at Shanghai, struggling painfully up from Foochow. Some successes have been reported. But it is slow work moving armies over the roadless face of China. Thrust back here, the Communists overflow somewhere else, and their net loss is small. As General Chiang said recently, the problem is three-tenths military, seven-tenths administrative. And there's the rub. Nanking's greatest difficulty, a prime cause of China's troubles to-day, has always been to get its orders obeyed in the provinces; and, added to their ascendancy over the peasants, the Red doctrines appeal more to disgruntled young intellectuals.

An Opportunity That Was Lost

If the Kuomintang had possessed a modicum of statesmanship and common-sense, Communism might have been stamped out. When Peking fell in June, 1928, and all China was for the moment unified under the new Nationalist Government at Nanking, the prevailing enthusiasm was unparalleled. The country was sick of wars, all thinking men were frightened by the narrowness of the escape from Moscow's claws, and the business classes, encouraged to believe that the Kuomintang stood for constitutionalism and democracy, were only eager to help. The obvious course was to pen up the Communist forces in their mountain retreat in South Kiangsi and starve them into surrender, while devoting all energies to financial reform and the resuscitation of trade. But while one may gladly acknowledge the earnest goodwill of individual Nationalists, the Party as a whole appeared incapable of practical effort.

Innumerable trumpery reforms poured from Nanking, dealing with such trivialities as clothing, birthday presents, and how much to spend on a funeral, but no sign of reduced taxation and disbanding of the colossal armies, estimated at 2,500,000 men, which devour China. The solid business classes, who might have been of the greatest service, were rigidly shut out of all share in the administration. Worst of all, the Kuomintang, overriding the deep-grained instinct for local autonomy, the custom of China through three thousand years, which Dr. Sun himself had specially enjoined, attempted to bind the whole country in one cast-iron bureaucracy under the surveillance of District Council, the infamous Tangpu, whose extortion and barefaced plundering of wealthy estates is a scandal all over China. At the head, an extraordinarily cumbrous system of government by Committee (an evil legacy from the Russian days) darkened counsel and paralyzed action, while throughout the country big generals and small ruled like the robber barons of the days of Front de Bœuf.

Between militarists and politicians China was bled white. Tax bureaux sprang up like mushrooms. If, with great effort, the merchants got one tax abolished, it reappeared next day under a new name. A farmer bringing produce, say, to Hankow might have to pay at a dozen tax bureaux in as many miles. In many districts taxes have been wrung from the wretched provincials fourteen years ahead. Small wonder that the peasants " took to the hills " (otherwise turned bandit) in ever-increasing numbers. It was either that or starvation. In March, 1929, civil war broke out again and continued practically without intermission till October, 1930. Honan, the principal theatre of war, became known as " the grey zone," a term that needs no explanation. In the spring of 1930 a friend of mine wrote to me of a visit he had paid to a once flourishing little market town, Iyang, in Honan. In the previous twelve months it had been looted seventy-two times by rival armies and three-quarters of its wells were stuffed with dead bodies. On the top of these miseries came the appalling floods of 1931, when a tract of the Yangtze valley as big as England was submerged seven or eight feet deep in water for several weeks, and at least as much if not more, in the aggregate, in the basins of the Huai River, Yellow River and Grand Canal.

The Costs of Communism

Such conditions are Communism's most fertile ground. Descending from the mountains, the Communists spread rapidly over southern Kiangsi and Hunan, and overflowed into Fukien and Kwangtung, their progress everywhere being accompanied by hideous devastation and massacring among the well-to-do, Government officials, and members of the Kuomintang who are the special object of their hatred. A report written for the People's Convention at Nanking in May, 1931, by General Ho Ying-chin, now leading his fourth campaign against the Reds, estimated—and from independent report his figures appear conservative—that since the middle of 1928 the Communists had massacred over 260,000 people, burned 220,000 houses and destroyed £47,000,000 worth of property ; in addition, at least 1,500,000 people had fled from their houses. A further report from Kiangsi last June stated that three-quarters of the province was wholly under Red control and in the previous few months 570,000 refugees had received public relief ; but this was only a fraction of the destitute, the others being kept by friends and relatives.

These reports, however, are only for Kiangsi and Hunan. At the annual meeting of the British Chamber of Commerce in Hankow last April, the Chairman gave a detailed account of the Red forces operating throughout Hupeh province. " Hankow is in fact an island," he said, " upon whose shores the waves of Communism are encroaching like an ever-rising tide." Since then General Chiang Kai-shek's great campaign has pushed back the Communists, and in September he was reported to have bottled up the principal Red Army westwards of Hankow. But, in the usual inconclusive fashion of all Chinese civil wars, the success was not pressed, the Reds slipped through and were back within twenty-seven miles of Hankow in October.

In Honan, early last summer, an official report estimated the number of victims of Communism, dead or fugitive, at over 3,000,000. Each district affected was named, with its losses as far as they could be ascertained. In Anhui we have no exact figures, but from abundant missionary reports it is clear that the destruction is great. Through this province last summer the Communists got within eighty miles of Nanking. In Fukien they very nearly captured Amoy last April, when foreign men-of-war were sent to take off foreign residents. The attacker then was Sun Lien-chung, murderer of Miss Nettleton and Miss Harrison. He does not call himself a Communist, but inscribes his banners as " The Protecting Party for Saving the Government," just as other bands call themselves " Big Swords," " White Lilies " and the like. But, as said above, the impelling force is always Red.

How the Red Regime Functions

The core of the Red movement in China is in southern Kiangsi and Fukien, now a solid Communist State, roughly 400 miles long by 150 wide and embracing the important towns of Kian, Tungku, Futien and Juichin. Over five hundred villages and country towns are stated to have been completely Sovietized, little local governments managing their own affairs but always responsible to the central authority. Wherever the Reds penetrate they destroy all title deeds and landmarks and redistribute the land among the peasants. Small shopkeepers (and that, in China, means something inconceivably small) are spared. Wiser than their Russian prototypes, the Chinese Communists do not attempt to force the peasants to work for the State, but merely exact a tribute of one-fifth of their produce.

The chief authority of this so-called " Soviet Socialist Republic of China" is a Central Executive Committee, with seven Ministries. Under these are a number of District Commissioners, and papers have been captured describing an elaborate system of branches and cells, and special departments to seduce shipping, railway and industrial workers, which extends over all the principal towns of China. Even Peking, once immune, has had to organize special defences against Red contamination. Thus far, Communism has spread more among peasants than town-workers, partly because of the lure of redistributed land, partly because officials can keep a closer watch on the towns. But, as all China rests upon her peasants, the danger is but little diminished.

The organization of the Red forces is particularly interesting. The flower of them numbers probably not more than 140,000, if so many, of effectively armed troops, north and south of the Yangtze. These are highly drilled, very efficient and carefully kept for emergencies. The chief generals are Ho Lung and Chu Teh, both old associates of Dr. Sun, trained by Galens. Chu Teh is undoubtedly a born leader. His intimate associate is Mao Tse-tung, director of political activities, once a student in France and one of the earliest Chinese Communists. The combination of names " Chu-Mao" is a terror throughout China.

Next among the Red Forces come the Flying Columns, who rove about plundering and killing ; then the Red Guards, peasants armed with swords and spears to prey on the rich ; lastly the Women's Corps, trained to " vamp" the Government troops and seduce them to the Red banner. Whatever success the Women's Corps may have, the alacrity with which the ill-paid Government troops, whose pay is often months in arrears, desert to the Reds has wrecked many an assault and provided the Communists with much-needed arms. At all times the Reds are most difficult to pin down. They are very mobile, know the country well and, if in danger of being cornered, hide their arms and pose as ordinary field laborers.

Inner Workings of the Organization

That there are many Russians with the Communists in China is doubtful, though on good authority some are said to be working in the Red arsenal in south Kiangsi. White men are as conspicuous as a skyscraper in the interior of China and the officials keep an anxious eye on every entrance. But that the Third International is in constant touch with the Chinese Communist Party is unquestionable. There are some eight hundred Chinese students in the "Sun Yat-sen Chinese Workers' University" and the "Stalin Eastern Workers' Communist University" at Moscow (both liberally endowed by the Bolshevik Government) and from them a steady stream of native agitators is poured into the Far East. The Comintern maintains an agency in Shanghai, as does the Pacific Workers' Union, another Communist organization. But both these received a bad shock a year ago through the arrest of Noulens, or Ruegg, and his wife, which uncovered the bases of the Third International and led to the flight of several of its best agents in the Far East.

The Noulens had five joint and seven or eight individual aliases, and accounts for a large total in seven Chinese banks. Of the mass of papers and books seized at their lodgings the majority dealt with the Red revolution in China, the remainder with similar plots in Korea, the Philippines, Indo-China and the Straits Settlements. Important arrests were the result in all these countries. The closeness of the connection between the Third International and the Chinese C.P., as well as the monthly subventions received by the latter from Moscow, were shown in every paper. The Noulens were handed over to the Chinese Government and eventually to death last July, after a very careful trial, the sentence being instantly commuted to life-long imprisonment. Thousands of lesser Chinese offenders have gone to the strangling-post without ceremony.

The exact numbers of the Chinese Communist Party are not known; estimates vary between 70,000 and 300,000. Training is strict and a candidate must prove his or her "purity" under searching tests before being admitted to membership. Where Soviet rule prevails, revenue is collected chiefly by land and business taxes. A People's Bank and a Workers' and Peasants' Bank in south Kiangsi and Fukien, and several popular schools, as also a number of public dispensaries, have been opened. Freedom of marriage and abolition of the "gift money" required by the bride's parents are enforced, and, of course, a dead set is made at religion in all forms and creeds.

Naturally, the Communist dominion wavers at the fringe under the intermittent pressure of Government attacks. But wherever it goes it causes such confusion by destroying all records and title deeds that the Government is faced with the greatest difficulty in restoring order. There are the usual divisions within the "C.P.", between the "Stalinites", all for terrorism and extremes, and the "Trotskyites," more for evolutionary methods. In such controversies victory is usually to the extremists. In any case the spread of the Red influence does not appear to be affected. Hitherto the Communists have been staved off from the biggest towns. But if they captured a seaport, through which they might get arms and munitions from Russia, Nanking's days might well be numbered.

Mongolia As A Factor

The gravity of the situation is immensely increased by the fact that Mongolia is virtually a Russian province. Its allegiance to China had been growing ever weaker since the Manchus' downfall, and, after a series of adventures too long to detail, it set up a People's Revolutionary Government in 1921 and called in Russia, who has since reorganized it as the Socialist Soviet Republic of Mongolia, affiliated to the Soviet Union, with a Mongolian Red Army officered by Russians. The base that this will give the Bolsheviks for propaganda in North China is obvious. China has protested, but in vain, Russia maintaining that Mongolia is free to do as she pleases. That the growth of Communism in China and the fear of its linking up with the Mongol Reds and the strong Russian influence in north Manchuria is a big factor in Japan's stubbornness, cannot be doubted. Lord Lytton clearly feels as much, and admits that the fact is no small excuse for Japan. Her dread of "dangerous thoughts," otherwise Communism, transcends everything, and there are many Japanese who believe that Communism in China will win.

So do not few Chinese. It is impossible to open a Far Eastern newspaper, foreign or Chinese, without finding something about Communists, their outrages, their plottings, or suggestions for coping with them: and undoubtedly Nanking's one desire is to achieve some face-saving arrangement in Manchuria in order to concentrate all efforts against the Communists. Before taking the field in July, General Chiang Kai-shek held a consultation at Kuling (a summer mountain resort on the Yangtze) after which a new policy was announced—not extermination of the Reds, but to outbid them in popular favour. Prisoners of the rank and file (apart from convicted Communist leaders) are to be helped to start afresh on their farms, while every effort must be made to redress grievances and improve conditions of life.

Most significant is the argument of Dr. Hu Shih, "the Sage of modern China," whose fearless criticisms of the Government are famous, that the present distribution of land must be accepted; old proofs of ownership are so completely blotted out that restoration is impossible; the Government must convince the peasants that it is not fighting for the landowners against them. The case thus put may be regrettable, but it is plain common-sense. No other course is feasible.

That General Chiang and his fellow realists are in deadly earnest, is sure. That they can succeed, without help, is hardly believable. None of the promised administrative reforms appears yet to have been realized. In fact, the problem is too vast and Nanking's control even over matters well within its reach is too puny. On the other hand, a firm offer of help by the League of Nations—which possesses the inestimable advantage of being above any suspicion of axes to grind—as urged by the Lytton Report, would not improbably act as a general tonic. The problem is largely psychological: the Chinese are helpless in face of their troubles because they are well-nigh hopeless and because nobody seems to care what becomes of them. If that impression were removed, they might be nerved to make a fresh start. The other part of the problem is, as usual, an empty Treasury. But the merchants and bankers would find the money fast enough—as they offered to do in 1928—if they were assured of it being put to a practical use.

The peculiar tragedy of the Sino-Japanese conflict is that both parties have the strongest motives for coming to terms, if only "face" did not keep them apart—China, in her anxiety to be free to wrestle with the Communists: Japan, hardly less interested in that than in the recovery of her lost trade. Herein wise counsel may find a bridge. But no amount of persuasiveness alone will bring peace in China. Tangible, practical measures alone will serve, and they are urgently needed. For "Communism *v.* Nationalism" is an issue not for the Chinese only, but for all the world.

Yung River Dam

Messrs. Lin Wen-kai and Liu Chi-wen, who were appointed by the South-west Political Council at Canton to select a plan for the construction of the Yung River hydro-electric power plant, announced the following plan for the proposed project.

The Yung River hydro-electric power plant will be situated on the Yung River at Sooksiu Ngom in Yungyin District.

A dam, 100 feet high, 80 feet thick at the base and 20 feet thick at the top, and 500 feet in length will be constructed. The flow of the Yung River, which is 2,500 cubic yards per second during the dry season, will be regulated so as to flow at a rate of 5,000 cubic yards per second during the dry season.

Five 5,000 kilowatt dynamos will be installed to generate electric power of 6,600-volts for transmittance over a distance of 93 miles to Canton. A potential output of 66,000 horse-power and a normal output of 36,666 horse-power will be available. The dam will have a water area of over 200 mow and an additional surrounding area of 500 mow.

The construction of the entire power project will require an expenditure of from G.$5,000,000 to G.$10,000,000.

The construction program will be divided into four stages, *i.e.*, thorough investigation of the dam site, systematic planning and estimation of the construction costs, invitation and consideration of construction contracts, and supervision of construction and installation operations. The work of the last stage will require approximately four years to complete. The entire project is expected to be finished within six years.—*Canton Gazette.*

The Road to National Salvation

By *WANG CHING-WEI, President of the Executive Yuan of the Nanking Government**

AT this most critical moment in the history of the country, when all the comrades are striving their utmost to meet the situation, I could not, in all conscience, remain in Europe to complete my cure and recover from the effects of my prolonged illness. When the deplorable news of the fall of Shanhaikwan reached me in my hospital at Tubingen, I felt that in spite of my poor health I had to return to China at once.

My anxiety was further increased on my way home when I learned of the loss of Jehol, although, subsequently, I was gratified to hear the news of Comrade Chiang Kai-shek's departure for the North. I felt considerably relieved because I knew what effect General Chiang's presence would have on the morale of our men at the Northern defence lines, how it would strengthen their determination and fighting spirit. On the other hand, when thinking of the sufferings and sacrifices of our troops at the front and of the difficulties confronting the various comrades in the Central Party and Government organizations, I could not help feeling more and more uneasy. This being my first public utterance since my return to China after an enforced absence of so many months, I am taking this opportunity to express my heartfelt appreciation for what the comrades, both at and behind the front lines, have gone through.

China's position to-day is such that there is no alternative but the most determined resistance. It is true that diplomatic negotiations must go hand in hand with armed resistance, but of the two it is the latter which is more likely to lead to a fundamental solution, for without resistance there can be no prospect of success in negotiation.

The recent decision of the League of Nations has clearly proclaimed Japan the aggressor and China the wronged party. This proves that international justice is not yet extinct. While this may be regarded as the result of diplomatic negotiations, it is even more so the fruit of our resistance. Hereafter, therefore, the more strongly we resist the more hopeful will be the results of our negotiations. This is why I say that the only way out of the present situation is to be found in active, determined resistance.

With regard to a successful policy of resistance, we must realize that the first requisite is the unswerving determination on the part of everybody concerned to carry through the policy, the second, the development of our national strength and ability. It is necessary that every single individual in the country be determined to face the difficult national situation. But this, I think, is already generally, recognized throughout the country.

What we therefore must concern ourselves particularly about, is our strength and ability to continue the resistance. How is this particular ability expressed if not primarily in armed force ? The fact of the matter, however, is that we are sorely deficient in military equipment. Our guns, bombs and other implements of war are not comparable to those of our enemy and the fighting which is now going on between our comrades at the front and our enemy is almost comparable to a fight between unarmed flesh and blood on the one side, and highly mechanized implements of modern warfare on the other side.

Where are the implements of war to come from ? And is our strength and ability to resist only expressed in fighting machines? We are an agricultural nation. But, according to Customs statistics, we imported food-stuffs to the amount of Tls. 300,000,000 for last year. This means that, agricultural nation though we are, we had to spend Tls. 300,000,000 on imported food-stuffs or the entire nation would have had to face starvation. What surplus funds could we in these circumstances really have to purchase arms and ammunition ? I have mentioned this to show that resistance is not limited to military weapons. In other words, there are other equally, if not more, important aspects to the problem of resistance.

A modern nation pays the greatest attention to the question of productivity during ordinary times. The productivity of a people must be increased in normal times so that in times of war all resources can be utilized. Therefore, the greater the people's productivity, the greater their power of resistance. Take for example Russia. The former Czarist Government paid little or no attention to the productive enterprises of the Russian people and laid only stress on military preparedness, with the result that after the war broke out with Germany, Russia rapidly went down to defeat. Take another example, the United States of America. The American Government, while generally not concerned with the question of military preparedness, was able at a moment's notice to summon together 2,000,000 soldiers and was able to ship huge quantities of military supplies to Europe as soon as war with Germany was declared. There is only one explanation to this and that is the American people had attained to a high degree of productivity. Thus it is obvious that the ability to resist lies primarily in the productivity of the people.

But how is a people's productivity to be increased ? My reply is that the first necessity is that the people be given the opportunity to lead a peaceful life and fully to enjoy the fruits of their labours. Their life, property, and freedom must be fully protected. So, when you speak of resistance, you immediately go to the fundamental questions of political administration and social adjustments. In this light, the problem of military preparedness thus becomes a problem of secondary importance.

Moreover, as a matter of fact, our ability to resist is not altogether a material one ; for the spiritual aspect is at least of equal importance. I do not wish to take you back to the past, but let me just cite one example. The fall of Chengteh was the direct result of non-resistance by Tang Yu-lin's troops. These troops were generally fairly well equipped and armed. Why did they fail to resist ? For the simple reason that they were cursed with the planting and the smoking of opium. Is it to be wondered that the result was as it was ? from an opium-cursed army. As for the people, they had been forced to plant and smoke opium, and even if they had wished to resist, they did not have the necessary will power and strength. It was too much to expect them to resist at all, not to say for any length of time. The outcome was a foregone conclusion and this was what had actually happened.

It is plain, therefore, that of two armies with similar equipments, only the one that has received proper training and has imbibed the spirit of the National Revolution can be depended upon to offer any effective resistance. Victory invariably goes to those who have the necessary will power and are imbued with the proper spirit even though possessing only inferior equipments ; never to those who lack the proper spirit even though they may be in possession of all kinds of material advantages. This is especially true in the military sphere. In a word, in trying to strengthen our power of resistance we must go deeper, down to the fundamental questions of political and social adjustments. For on their solution depends our power to increase the national productivity, and, in turn, our military preparedness.

The real problem confronting us is therefore not the problem of resisting the Japanese aggression, but the very problem of national preservation. The entire people must realise that they are struggling for their national existence. Not only must we be spiritually determined, but we must also develop our material ability to resist. Failure in either would face the nation with complete extinction.

The conditions to-day are reminiscent of the conditions prevailing 300 years ago when the Ming Dynasty came to its tragic end. The Chinese generals were then fighting against the Manchus at Liaotung, while the officials charged with the destiny of the nation were loud in their demands for resistance, treating those who even mentioned peace with the Manchus as traitors. The reality, however, was that while there were plenty of soldiers, there was no ammunition. China's armed forces then thus amounted to only so many generals without soldiers, for soldiers do not count when they have no fight in their hearts. And when the enemy arrived, there was no other way of showing one's patriotism but death. There was the determination to resist but there was not the strength to resist, and the country therefore was completely lost.

It is not for us to travel the same path to-day. The fact that we do not at present possess adequate equipment for resistance cannot be hidden. But with the country as big as it is, and with a population of 400,000,000, it is sheer cowardice to insist that we cannot attain to the material strength necessary for, and be guided by a spiritual inspiration to a successful resistance.

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*As published in the *Shanghai Evening Post and Mercury*, April 7, 1933.

Our problem is fundamentally not the lack of productivity. With the common people, it is purely a case of protection and assistance. In fact, occasionally our people fail in their productive enterprises through misgovernment. If we can pay attention to protecting and assisting our people to produce, and then apply their productivity to matters of military preparedness, we can hope for a lengthy period of resistance.

During my illness in Europe I carefully studied the various resolutions of the Third Plenary Session of the Party pointing out the needs of the times and laying down the general principle for the Party to follow. But what we need to-day is action, not words—immediate action. Our ancient sages said, "The good and the bad are enough to ruin the nation." By this it is meant that if we cannot make use of the good and discard the bad, the country will head for destruction. Merely having a mixture of good and bad is like so many words; making use of the good and avoiding the bad means definite action. When one dwells upon this point, one cannot help feeling remorseful.

Why have we not been able to enhance the productive power of our people? Why have we not been able to apply our people's productive power to military strength? It is entirely due to the fact that the bad ones among us have been engaged in destructive activities and caused all kinds of obstacles, exploiting the fact that the Central authorities, with their hands full in dealing with the problem of resisting Japan, cannot give the attention to make their destructive activities impossible. The Central authorities, however, are determined to see that these destructive elements put an end to their sinister activities. For it is only by exposing their crimes and stopping their destructive activities that those who believe in co-operation can effect solidarity among themselves and be able to face the crisis. As for the bad elements, they can only be treated as outcasts. Whether we can make use of the good and discard the bad is a question of action; and whether we wish to make use of the good and discard the bad is a question of choice. If we are determined in our choice of action, then it is not difficult to see action; otherwise, only empty words will be the result.

China's road to national salvation thus lies fundamentally in the strengthening and fostering of the democratic and other reconstructive forces of the country, not in the blind, superficial imitation of other countries, nor in the wholesale transplantation of such alien systems as Communism and Fascism. The popular saying that everything foreign which comes to China becomes bad and corrupted contains a great deal of truth, and my convictions have only been strengthened by what I recently saw and observed in Europe.

The so-called Communist experiment has been tried, and found wanting. It is nearing its end, and no useful purpose is thus served by enlarging on it here. This is, however, not the case with Fascism, which is acquiring an increasing, if yet insignificant, number of adherents in China. Fascism is said to have saved Italy; it is being officially tried in Germany; so why not apply it as a panacea to China's ills?

But the advocates of Fascism for China forget that there are certain fundamental differences between the conditions in China and the conditions in Italy and Germany. Both these countries are essentially democracies, with a long period of political education along constitutional lines, the people there being in possession of certain constitutional rights and powers. How they utilized these rights is not for us to judge, but the fact is that the Fascist Dictatorship in those two countries is essentially civilian in character, neither Signor Mussolini nor Herr Hitler being military leaders. No armed force worth speaking of entered into play when the Fascist régime was established both in Italy and in Germany. Eight thousand Italian Fascists marched on Rome, it is true, but the Fascist dictatorship in Italy was not the outcome of civil war, while in Germany the Fascist Dictatorship was primarily the result of the ballot box. Both Signor Mussolini and Herr Hitler effected a *coup d'etat*, but their *coup d'etat*—if what they did could be called such—was only in the nature of a constitutional revolution.

China, on the other hand, is still dominated by a feudal militarism. The people here enjoy, generally speaking, very few rights; they are still far from the constitutional period—suffering under the oppression of a predatory militarist regime. Even under the nose of the Japanese invasion armed forces have been utilized for the purpose of settling internal differences, and in the last fighting in Szechuan alone between 40,000 to 50,000 casualties were suffered. And while the Central Government is getting stronger every day, it is yet unable to exercise the full force of its authority throughout the whole of the Republic, being in many parts hampered by the prevailing system of regional independence under predatory militarists.

In these circumstances, a Fascist movement in China could only mean a movement for the establishment of a military dictatorship. And since there are so many outstanding military leaders, an attempt of any one of them to proclaim, with the aid of the so-called Fascists, himself the dictator of China would immediately lead to a most sanguinary civil war on a nation-wide scale. And to what purpose? Our primary efforts should be directed to fostering and strengthening the democratic and other reconstructive forces of the nation, to establishing a true democracy, not to instigating movements which could only lead to national self-destruction. After we have established a true democracy, it is still time to think whether we would go the way of Britain and France or that of Italy and Germany.

With the national state of affairs at such a critical stage, the above may sound unrelated and disconnected. But it is important to realize that there is no other way open to us except carrying on as best as we can. We cannot now even afford to speculate on the chances of success and failure—not even of life and death. We can only prepare ourselves so that we will have an opportunity to die on the field of honour instead of in our beds.

Although we may not live to see our nation saved, we must show our successors a definite way out. And that way is by promoting and fostering productive enterprises, and applying such productive power to military purposes, so that we may carry on an effective and sustained resistance for the preservation of our nation.

Historical Backgrounds

Suggesting Reasons for One or Two Omissions Lost Sight of at Geneva

By C. J. LAVAL

"The issues involved in this conflict are not so simple as they are often represented to be. They are, on the contrary, exceedingly complicated, and only an intimate knowledge of all the facts, as well as their historical background, should entitle anyone to express a definite opinion upon them."

Having pronounced this dictum, the Commission of Enquiry of the League of Nations proceeded to write about a hundred and fifty thousand words giving judgment on the merits of the controversy in the Far East. Then this particular premise was taken from its original source in the Lytton report and was adopted and made a part of the Committee report, which was submitted in February to the Assembly of the League, and which was adopted unanimously by that body over Japanese protests. It is to be wondered if the bitter irony of Matsuoka was lost upon his hearers in the League Assembly when he said innocently that he supposed that all present had read histories of China written by impartial authors. So far from having read histories of China, the Japanese spokesman seemed to entertain more than a lurking doubt whether the Assembly members had even read the Lytton report itself.

Of the distinguished members of the Commission of Inquiry headed by Lord Lytton not one has been notable for previous activities in or for special knowledge of China and Manchuria. In this group representing five great powers were Count Aldrovandi of Italy, Dr. Heinrich Schnee of Germany, General Henri Claudel of France and Major-General Frank Ross McCoy. These are personages of eminence, but not one of these names has a place in the troubled annals of Japan and China. Their position with regard to knowledge of Far Eastern affairs was set forth simply by Lord Lytton, the British head of the Commission, when he said in a recently published* interview, "I was no student of Japanese history when I went there, but merely a man who went there from the outside world to seek facts." What this Commission learned about China and the Manchurian controversy was assimilated in a frenetic expedition that involved 185 days of whirlwind travel through parts of China, Japan and Manchuria—by train, by motor-car, by steamer and by battleship. Wherein may be found some reason for the comment of General Araki, Japanese Minister of War, who said that the Lytton report was "nothing more than a travelogue."

In this connection one of the lesser incidents of the visit to China of the League's Commission of Inquiry is enlightening. This happened when the preliminary investigations had been completed and when the members of the Commission were casting about for a place to meet and write their report. Several places were suggested, but the members of the Commission seemed inclined to go to Peiping to complete their task. With some thought for the comfort of the travelers in the hot summer weather a suggestion was made to one of the five members of the Commission.

"You should go to Tsingtao to write your report. It is cooler there," was the advice offered. The Commissioner, who shortly was to have a major part in passing judgment in the great issue, disagreed with this viewpoint.

"We shall prepare our report in Peiping. We cannot go to Tsingtao to do this," he said. "You see," he went on kindly to explain, "it is the feeling of the whole Commission that the work of preparing the report should be done within the territorial borders of China."

An Intensive Course of Study

Thus the Lytton Commission, having acquired in the space of a half year "an intimate knowledge of all the facts, as well as their historical background," and therefore having become entitled "to express a definite opinion upon them," solemnly assembled at Peiping—"within the territorial borders of China"—and drafted the celebrated report, which in due course went forward to Geneva. It is to be observed that the League's Commission of Enquiry acquired its knowledge of the conflict in China, and its historical background, within the space of six months. Undoubtedly due to assiduous and unflagging effort, with the Lytton report in hand to aid them, the members of the League Assembly also assimilated this mass of information, and they did this in less time than the Commission of Enquiry. If they had failed in this, of course, by the premise set forth in both the Lytton report and in the report of the Committee of Nineteen in the League Assembly, the members of the Assembly would not have been entitled "to express a definite opinion" regarding the controversy in China.

It is the pedagogical view reflected in the titles of current magazine articles and editorials that "Japan is defying the rest of the world," and that Japan stands isolated under "condemnation of the whole world." This opinion rests, of course, on the result of the vote in the Assembly at Geneva last February when the representatives of forty-two nations rejected the plea of Japan and adopted the report of the Committee of Nineteen and, along with this, the Lytton report.

The great majority of the forty-two powers whose representatives took this course possess no interests of any kind in the Far East and they would be both unable and unwilling to assume any responsibilities in the Orient that might grow out of a decision in the Assembly of the League of Nations. It is said that at least eighty per cent of the representatives of the forty-two powers at the February Assembly meeting never had been in the Far East. They took the Lytton report as a talisman to guide and sustain them, and their action, after all, proved only that the League of Nations simply is an European sodality restricted in its interests to this sphere. The vote in the Assembly at Geneva on the report of the Committee of Nineteen was, in fact, not a decision having anything to do with the situation in Manchuria or with controversies in China. For the rank and file of those at the Assembly it was the outcome of a debate on an abstraction having particularly to do with safeguarding of boundaries of lesser states in Europe and with keeping the leaking craft of Continental affairs afloat. The representatives of those major powers, which do possess interests in the Far East, and which, therefore, might find themselves obliged to shoulder burdens of responsibility created by the League Assembly, moved through the proceedings at Geneva with visible reluctance and in supporting the action that was taken at length, mindful ever of the real nature and of the primary underlying purposes of the League, their course obviously was one of pure expediency, carrying them only as far as circumstances compelled them to go in the face of a highly explosive situation in their own back yards.

This was no condemnation of Japan or of Japanese action in the Far East. Japan does not stand isolated as a culprit in the eyes of the world after this Geneva pronouncement, else perhaps one would not discover Matsuoka, homebound from his jousting in Switzerland, lunching pleasantly with Henry Ford at Detroit. It is to be observed also that even the most warlike pacifists no longer talk of sanctions, and from the States, somewhat unexpectedly, comes a timely comment from that former American Ambassador to Tokyo, Mr. William R. Castle, who was Under Secretary of State in the Hoover administration. He cast a ray of light through the murk in an address at Philadelphia when he asserted that his former Chief, Mr. Stimson, in the several pronouncements that issued from Washington last year had not meant exactly what popular belief had been led to suppose that the Secretary of State had said.

"The 'Stimson Doctrine,'" Mr. Castle explained in his speech, "did not obviate the possibility that the United States may recognize Manchukuo. At the time that policy was enunciated," Mr. Castle continued, "it was not stated that the United States would never recognize Manchukuo. Times may change the conditions and times may affect the entire problem."

What the Geneva Decision Implies

For all that it is worth, however, the decision at Geneva has been written into the record. A judgment has been rendered by the one existing international entity presumed to have authority to speak in the affairs of nations. The inference that flows from this judgment, if any account is to be taken of the "historical background" of the situation, is inescapable. The conclusion only can be that the League endorses China, past and present, and holds that the course of events as they have been unfolding through the years in this country, that is, obstruction and hatred for the outside world, and turmoil and disorder within, should be continued as desirable.

In one of his addresses at Geneva Matsuoka made fleeting reference to the complete omission from the Lytton report, and consequently from the report of the Committee of Nineteen, of achievements that had been brought about in Manchuria through Japanese influence, tangible things that are there for any observer to see in the form of vast and diverse works of improvement, municipal administrations, engineering plants, hospitals, schools, farms, sanitation systems, all created under direction of the South Manchuria Railway in the years that saw one of the most spectacular migrations of people in the history of the world, brought about by peace and prosperity in the country which were later to be shattered under the tyranny and rapacity of the Chang oligarchy, the régime that thrust the people of Manchuria at length into a plight similar to that from which they had fled from Shantung and Chihli in China proper.

As a section of "historical background" the Japanese spokesman also might properly have presented the moving story of his nation through the space of a single life-time since his country was opened by Commodore Perry. The contacts of China and Japan with the Occidental world had their beginnings centuries ago, but the first real impact of western peoples on the Far East dates back less than a century and China felt the thrust first, some thirty-odd years before Japan reluctantly opened her doors to the insistent American visitor. The courses that the two Asiatic nations followed when confronted by the new conditions imposed from overseas went along similar lines only in the very beginnings. Japan was fortunate in being able to profit in a measure from the experiences China had been enduring with the foreigner, but very speedily Japan comprehended what China has not been able to grasp to the present day, and this was the necessity for a change of heart and a change of mind to meet new and strange conditions. Therefore in 1868 immediately after the restoration to power of the Emperor the wording of a Memorial presented by a group of dignitaries to the newly established Imperial Court at Tokyo is significant. It reads :

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* *Collier's Weekly*, January 14, 1933

> *In order to restore the fallen fortunes of the Empire and to make the Imperial dignity respected abroad, it is necessary to take a firm resolution, and to get rid of the *narrow-minded ideas which have prevailed hitherto*. . . . . Let the foolish argument which has hitherto styled foreigners, dogs and goats and barbarians be abandoned ; let the court ceremonies, hitherto imitated from the Chinese, be reformed ; and let the foreign representatives be bidden to court in the manner prescribed by the rules current amongst all nations."

This was just fourteen years after the signing of the original treaty with the United States, the first that Japan signed with a western power. In this particular period in China Viceroys were playing hide and seek with foreign envoys, avoiding interviews or discussion with them while utterances from the unapproachable court at Peking with reference to western powers held to the lofty condescending tone adopted toward " Our barbarian vassal states overseas." The spirit of arrogance and the assumption of superiority over the barbarian amongst the official and educated classes in China were unmeasured. It was in this year, too, that the former American Minister to Peking, Anson Burlingame, who was the champion pacificator and conciliator of his day, was heading a mission to western powers and was enthralling American audiences with imaginary beatitudes of Chinese life, which he himself believed true, telling the throngs that gathered to hear him that the Chinese were extending their arms toward " the shining banners of western civilization " and inviting the missionaries to come to China to " plant the shining cross on every hill and in every valley." At this precise time the Chinese were butchering missionaries and foreigners indiscriminately all over the land and stimulating with ferocious zeal one of the worst waves of anti-foreign hatred that the country has experienced.

Due to her early prescience in dealing with the foreigner Japan's progress was swift and uninterrupted toward her present eminence as a great power. *" In less than half a century she entered the family of nations and met Europe on its own ground by negotiating in the various capitals of the world the removal of the limitations placed upon her by the early treaties. The Japanese people showed conclusively both the political ability to set their house in order by effectively governing the country so as to protect native and foreign lives and property, and the military ability to guard themselves against foreign aggression."

Unchanging China

China is unchanging. All the polished suavity of her westernized diplomats and her western-trained leaders is but a tenuous veneer over the underlying stratum of racial character. The mentality and methods of past generations are unaltered in the Chinese to-day ; they merely are modified superficially to conform with a modern setting. The illusion of superiority after a century of abasements at the hands of outsiders is as ingrained as ever it was and the spirit of arrogance, discreetly hidden when the urge of necessity presses, has all its ancient vitality. If it be doubted that these aberrations persist it is to be remembered that thirty-three years ago a deluded China declared war on all the western powers and as recently as seven years ago the redoubtable leader of the Kuominchun, Feng Yu-hsiang, talked openly of " declaring war on England " while to-day many leaders desire to make war on Japan. Through the past decade the unhappy people have been compelled to maintain armed forces greater in number than the combined military strength of all the great powers and these troops have ranged back and forth over the face of the country paralyzing normal national activities, leaving destruction in their path and slaying at a conservative estimate a million of their own people a year. With all this show of martial ardor China is to be found in every time of real peril in the rôle she has elected to enact, the " sick woman " among the nations, colossally supine, yet ever clamorous for the right to perpetuate her own disabilities.

A charter of liberation was accorded to China by the foreign powers in 1922 and the nation was left untrammelled and undisturbed to work out its own salvation with every encouragement and assistance that the foreign powers could give. One after the other institutions that had been under foreign control up to the time of the Washington Conference were given over into her keeping and the results are written in the chronicle of the years and in the records of official inquiries such as those held in connection with questions of the judiciary and of extra-territoriality. Through an era marked by a spirit of unlimited conciliation and helpfulness manifested by the foreign powers China has not recorded a single act of sincere co-operation or of appreciation. The obstructionist tactics of early days have been altered only by the addition of modernistic trappings, and the purpose in lesser and in greater things to discredit and damage foreign interests has been steadfast in the Chinese mind. This is apparent in the course of contemporary events ranging from the controversies over the roads and electrical connections in the areas surrounding the foreign concessions at Shanghai up to the repudiation of treaties and the attempts to divest foreign interests of all they possess in the form of privileges legally accorded under extra-territorial grants.

And then Japan Said—Sayonara

All these things, it is submitted, have a proper place in the historical background of the conflict in China, but the Assembly at Geneva when it last met was dealing with other affairs and the rights and wrongs of China and Japan and their Asiatic troubles had nothing whatever to do with these other affairs. The fall of the dice in Europe favored China, but it begins to seem that the dice were loaded. Japan, finding her contentions ignored or denied, quickly sensed this. She put forward the viewpoint that the decision that had been taken did not conform with the rules laid down by the League itself—that is, with the Covenant of the League. She became aware that the action of the Assembly had not been taken with any regard for the peace or the welfare of the Far East, but was taken specifically to preserve the machinery at Geneva in order to safeguard the peace and welfare of Europe. In this sphere she has no special concern, so convinced that the problem in her own part of the world was to be left to solve itself—a sinister consequence for her—she reached her own conclusions about the situation that confronted her, and she did the logical thing, bowing politely and saying—Sayonara. And this action thrusts upon the rest of the world the question—What are you going to do about it ?

Some thirty-odd years ago a device was found to clip the spreading wings of Dai Nippon. This was a detail of European political intriguing of that time when France, Germany and Russia snatched away gains Japan had won that Russia wanted. This same thing might have happened again some ten years later but for the sagacity of the great American President of that time, who was gifted with a keener vision into the mazes of the Far East than has been vouchsafed to the statesmen of recent years. Roosevelt at that time told Germany and France to desist, and this, coupled with the effects of the then newly concluded Anglo-Japanese Alliance, was sufficient to put a blight upon any notions of aggression that might have taken root at Potsdam. It is too late to-day to call into play this method of the past. The League formulae for imposing penalties likewise admittedly are inapplicable. In these circumstances it appears that those who clamor for penalties and punishments have found themselves forced to fall back on a hopeful belief that Japan, carrying the biggest budget in her history with huge foreign commitments that she must meet with a greatly depreciated currency, must plunge to an economic crash with the consequent collapse of her government.

Unquestionably the financial situation in Japan and the position of her industries and trade are matters that present for her leaders grave problems—not unlike problems in other parts of the world. The economic collapse of Japan, and the economic collapse of the whole civilized world, are possibilities that economists to-day admit. But with special regard to Japan it should be pointed out to the prophets of gloom that the dole is a thing unknown in Nippon, and in the busy thronged streets of her cities the traveler will see no hunger marchers and no bread lines, and he will encounter no beggars.

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*Morse and MacNair, Far Eastern International Relations

Say It in Chinese

FEW nations in this world are free from foolish laws and statutes, and all nations adopt legislative and administrative measures which are peculiar to their own necessities. Laws and regulations that fall into this special category are often inept and sometimes freakish, but they are generally brought into being by special geographical or commercial requirements that are unique in the particular cases. In connection with such measures the powers in general see to it that the administrative machinery needed in these cases is provided. Latterly all these odd regulations of foreign governments have engaged the enchanted attention of Chinese leaders who proceed blithely to bring them into operation in China without regard for any special needs or for unsuitable conditions, and without administrative agencies to control them.

The fore-runner of all this sort of thing undoubtedly was the ten gold dollars visa fee for passports. This was a shining example of American administrative idiocy, the contribution of a mid-western legislator back home from a congressional junket to China, who perhaps couldn't think of anything else to do. Afterwards, when the magnitude of the blunder began to become evident, the American Government sought to ameliorate the conditions that had been created for American travelers through the method of reciprocal arrangements with other governments under which visa fees could be waived. Such an arrangement was made with Japan, despite all the Nipponese resentment over American immigration restrictions, but thus far China has been deaf to suggestions in this connection, realizing that comparatively few Chinese travel to America and those who do generally are well able to meet this special charge. In this situation China saw a sweet source of revenue for her financially hard-pressed consular organizations abroad and a tidy bit of monetary nutriment from the *yang-kuei-tsi* for herself at home as well. The Chinese authorities, therefore, quite joyously accepted and adopted the ten gold dollars visa fee for passports and she introduced in connection with it, improvements and elaborations all her own. An American visa ordinarily runs for a year and with it the traveler can gallivant over and in and out of the States without having to meet any additional assessments. The sojourner in the Far East is not so fortunate and the luckless one who has to make a half dozen trips a year to Hongkong or Manila or to Japan must pay up in each case, for the ten gold dollars visa fee in China is for "one entry only." China is quite well justified in this, for the initial mistake was made at Washington, and, besides, she needs the money.

Having found the American passport visa fee system to be lucrative the Chinese authorities began to give heed to other American legislative specialties with the result that then was introduced by Nanking the requirement for consular invoices issued from Chinese consulates abroad for shipments of goods into China. This new requirement followed closely the American model with appropriate Chinese embellishments in the form of fines and penalties for failure to comply with the conditions laid down, conditions rendered by circumstances almost impossible to meet in many cases.

The requirement with regard to consular invoices for goods shipped into China was received with apprehension by commercial interests, both foreign and Chinese, when it was first promulgated last summer. As the result of a flood of protests the Chinese authorities saw fit to modify it to a degree and the date set for it to go into operation was advanced. It still is under fire of criticism and official complaint. The measure undoubtedly is a clumsy, and to commercial interests, a vexatious and costly attempt to transplant American procedure in regulating trade into the wholly different and unsuitable soil of China. The five gold units for each consular invoice and the system of penalties and fines accompanying the measure produce a certain revenue for Chinese consular offices abroad and for departments in China, but this same revenue might be obtained by other means less embarrassing to commercial interests in China and abroad. One suggestion put forward in this connection is the imposition of a stamp tax for arriving shipments instead of the consular invoice, which virtually is unobtainable in many quarters of the globe.

When the United States brought the consular invoice system into operation it was able to do so through its numerous and far-flung consular establishments abroad without unduly embarrassing commercial interests. It is noteworthy that the value of the system in checking the flow of imports into the States has been seriously questioned by the American authorities, who may see fit to abandon it. The main criticism against the system as applied to China, of course, is the circumstance that China has but the skeleton of a foreign consular service. An apt comparison was made by the British writer, Mr. H. G. W. Woodhead, C.B.E., in writing about the effort of China to bring into operation a measure requiring the use of consular invoices. He pointed out that in Europe the United States has more consular offices in the single country of Switzerland than China has on the whole continent, including the United Kingdom. China, in fact, has but four consulates in Europe—at London, Paris, Amsterdam and Hamburg—and in the United States she has the same number—at New York, San Francisco, Portland, Ore., and at Seattle. Shippers remote from these widely separated centers are required under the new regulations to obtain "from the nearest Chinese consulate" certified copies of invoices verifying the accuracy of the lists giving nature and quantity of cargo. In cases of failure to comply with the regulation the fines and penalties go into effect with the result that importers in China find their costs artificially increased to a marked degree, often to the extent that spells the difference between profit and loss.

After the consular invoice regulations, out of Nanking came a number of lesser measures conceived with the evident aim of putting hobbles on varied foreign interests. One of these was a requirement for the registration of all publications, not only with a particular ministry, but with the Kuomintang party headquarters in locations where publications are printed. The origin of this measure is obscure. Possibly it comes from Moscow, but it is a new halter and a new restriction, another move in the whittling-down process in the shape of a minor flank attack against extra-territorial privileges. The revenue producing factor of this special measure is not at once apparent, but what seems evident is that those foreign publications that yield and accept the new conditions surrender up just so much of their extra-territorial rights in doing so, and the penalties and surveillance that logically will follow after general registration is brought about will in the end carry with them their burden of costs. A later announced purpose from Nanking is to require the registration of individual journalists, particularly those serving foreign publications. In the case of these special regulations having to do with the press, despite all the pious Nanking governmental assurances of the privileges of a free press in China, the threat of the withdrawal of postal privileges is the lever the Nanking authorities have in their hands to compel compliance with their wishes.

Consider, kind reader, the latest foreign innovation in China, the "Regulations Governing the Marking of Foreign Goods with the Country of Origin." This is another "Made in America" product, but as it emerges out of Nanking it carries with it elaborations that are characteristically Chinese. In the first place the marking required on all imported goods must be in Chinese characters and in general it is required further that the marking must be incorporated in the fabric of the goods and actually made a part of the process of manufacture. Thus, in the case of watches and clocks, the required Chinese characters must be "incised on the frame holding the movement or works, or on the case and stamped on immediate and secondary container and also on the outer case packing." In the case of cutlery the Chinese marking must be "die-stamped, impressed or etched on each article and stamped or printed on immediate packing and on the outer case packing. In the case of electric bulbs and lamps the marking must be "indelibly marked on the bulb and also on any carton, wrapper or other container and stamped and stencilled on the packing case." Tin basins must have the marking "die-stamped, embossed or impressed thereon; or indelibly printed on the basin and stamped or printed on the wrapper or carton as well as on packing case or crate." Imported enamelled ironware must carry the necessary characters "durably applied to each article in a contrasting color by means of printing before fusing, sand blasting, or stamping with acid or silicate of soda and stamped or printed on any other container as well as on packing." Scientific glassware must carry the marking " applied to each article by acid-stamping or etching, sand-blasting engraving or burned on enamel and also stamped or printed on container and on packing case. On rubber goods the marking in the case of automobile tires must be " moulded on the wall of the cover of the tire so as to be visible when the tire is fitted on any wheel." Fountain pens must exhibit the Chinese characters "die-stamped, incised or engraved on the barrel of the pen ; or stamped or printed on a label securely affixed to the barrel of the pen " while gold pen nibs must have the marking " die-stamped, incised or engraved upon the back or upper surface of the nib and also stamped or printed on carton, special case or holder, as well as on packing case."

It has been suggested that this extraordinary measure, which if carried into effect would probably disorganize China's import trade, actually was evolved to place in the hands of anti-Japanese boycott organizations a new weapon with which to carry forward their illegal activities. At any rate with all these special regulations a willingness is displayed, in order to effect a problematic injury to an adversary to do incalculable harm to Chinese commerce and to the Chinese people, for it is through native channels that the vast tide of this commerce must flow and Chinese dealers and Chinese buyers are the victims who must pay the ultimate costs.

It is unlikely that Nanking's ingenuity in this untried field of special regulations has been exhausted and the nation may well wonder what will be the next innovation. When will it all end ? To speculate about what new obsession may seize upon the Nanking authorities is baffling. When one studies the ramifications of the requirements for marking foreign goods in Chinese characters with the name of the country of origin the thought occurs that probably the parents of future traders and missionaries in China should be warned in time, for the next incursion may be into the field of parturition. Here is an idea for the experimenting regulation makers to toy with. The offspring of future generations destined for life in China might properly be brought within the purview of the rules requiring marking that shows the country of origin. The necessities of such a situation should be no more difficult than those surrounding the regulations as they stand. In these cases the necessary Chinese characters might be etched or incised, or sand-blasted into the protoplasm so as to be visible through the epidermis at the designated spot. Why not ? This is right in line with the original quality of Nanking's other special statutes.—*val.*

The Japanese Ship Subsidy Scheme

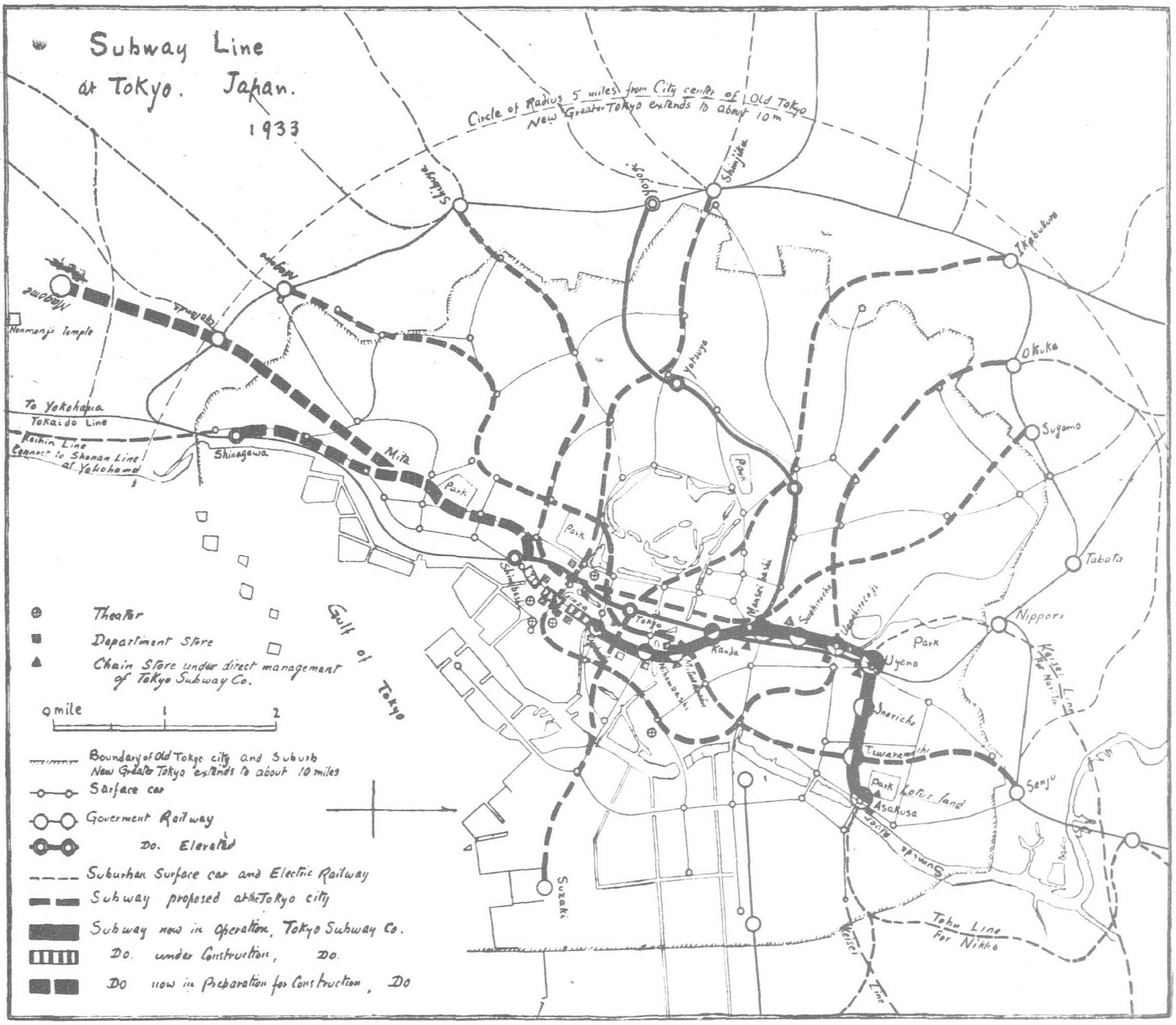
A BRITISH viewpoint with regard to the ship subsidy scheme of the Japanese Government, which is presented in the *Journal of Commerce*, has several features of particular interest. The editorial in question follows :

The publication of the full scheme of the Japanese Government for granting a subsidy to shipping to help in the construction of new tonnage, provided twice the amount of obsolete shipping is broken up, makes very interesting reading, for it is not difficult to see that naval considerations have governed the arrangement. Although the scheme permits a certain amount of compromise in special cases, it is normally only to apply to cargo ships of not less than 4,000 tons, with a speed of over 13½ knots, and according to the lessons of the war these are just the ships which are most useful to the Navy. From the purely mercantile point of view, Japan has nothing to complain of at the moment, and her position is certainly not one that would justify the expenditure of large sums in the present financial condition of the country. In 1914 she stood sixth among the world's maritime Powers, her Mercantile Marine amounting to 1,708,000 gross tons which was 1.9 per cent of the world's total. Now she stands third in the list, possessing 4,255,000 gross tons of steam and motor shipping, 6.2 per cent of the total. In the matter of modernity, too, the Japanese have very little to complain of, for although their old Mercantile Marine was composed principally of second-hand ships bought from European flags, it is very different to-day, and by far the greater part of the difference between 1914 and 1932 consists of modern ships, generally built by Japanese owners on the proceeds of the war boom.

Not all this tonnage is fast enough, however, to be acceptable to the Japanese Navy for service, either as auxiliary cruisers or supply ships in war-time. The greater part of it was built during the boom, when the great thing was to get something that would carry cargo with reasonable safety and despatch, but without undue expense or any elaborations that would delay the completion of the ship. The majority are good working vessels—many hastily built war-time ships have already gone to the scrappers—and that they suit Japanese trade excellently is shown by the fact that, according to the latest figures, the country only has 8 per cent of her tonnage laid up, the lowest percentage in the world, the average for which is 20. But all the encouragement in the new subsidy measure is for faster ships of improved design, and in that it is easy to see the requirements of the Japanese Navy. The existing Merchant Service contains a number of fast cargo steamers, 72 between 13½ and 15½ knots as compared with 27 in 1914, 19 between 16 and 17½ knots as compared with four, and five over 18 knots as compared with seven, although these five are more likely to be useful for naval purposes than the old seven.

It is an excellent showing, but it is not enough for their naval needs and, balancing the extra bounty that is offered for every half-knot with the extra fuel and other running expenses, it would seem that the second category, 16 knots and under 18, is the one that will be strengthened most by the subsidy. That is just the category that the Navy needs most, according to modern ideas. Before the war the great idea was to subsidize the fastest merchant ships for use as auxiliary cruisers, a legacy of the 'eighties, when British cruisers were deplorably slow and nothing like the equal of the fast liners. On this mistaken theory the various nations of the world spent considerable sums, particularly the British, Germans and French, but in 1914 it did not take long to prove that the crack liner of high speed was quite useless as a cruiser from a variety of reasons, particularly the difficulty of keeping her in fuel in war-time. On the other hand, it was proved equally clearly that the ship of 16 or 17 knots made a magnificent auxiliary for patrol purposes when backed by an adequate fleet of heavy men-of-war.

But the Japanese Navy thinks more deeply than auxiliary cruisers only, and one of the lessons that may still be learned from their conduct of operations against China and Russia is the economical and logical use of merchant ships for supply purposes. In those days Japan had to get practically everything she wanted for the conduct of the war from outside the country ; since then she has made wonderful strides in making herself self-contained, but there are still many things that would have to be brought from abroad in the event of war. Japan has a cruiser fleet which is excellently adapted for convoying purposes in the Pacific, and it is obvious that the first result of the new Subsidy Act will be to give her a big fleet of fast cargo liners which could form high-speed convoys without the trouble that was encountered during the war, when the speed of the convoy was regulated by that of its slowest ship, and there was infinite trouble in collecting sufficient 13, 14, 15 or 16-knot merchantmen together at one place to make a really efficient and safe convoy. With this latest encouragement to speed in definite grades, and the hold that the Japanese Government will undoubtedly maintain over the ships which are built with their assistance, this problem should be solved for the Japanese to a very great extent. From the Japanese naval point of view, therefore, the new measure ought to be eminently satisfactory, but it will mean a very heavily-loaded dice in the trade competition between Japanese shipping and that of other nations.



Tokyo's Subway System

By W. HARVEY CLARKE, JR.

NOTWITHSTANDING a grave liability to seismic disturbances imposed by nature upon a wide region circumscribing the metropolitan area of Tokyo, a group of its far-seeing citizens, braving what hazards might obtain from recurrent upheavals or sudden convulsions of the earth's surface in and near the city, combined confidence with resolution more than seven years ago—in 1925—when they began to construct the first link of the Japanese capital's underground railway system.

This initial link of Tokyo's subway line, when it was completed two years later, in December, 1927, covered not quite one mile from Azumabashi (bridge) near Asakusa Park to the Ueno railroad station near the park of the same name—a distance of 1.4 mile 2.33 kilometers). Building costs, when this stretch opened to the public, had exceeded Y.7,161,209, although to-day the estimated cost per mile of construction is placed by officials of the company at about Y.4,000,000.

Since subway construction was begun in Tokyo, work has continued apace without interruption; and periodically new sections along its route have been put into operation. On Christmas eve, 1932, upon the fifth and sixth sections extending from Mitsukoshi (department store) to Kyobashi (bridge) having been opened for service, the total operating length reached 4.002 miles (6.473 kilometers). Day and night now, work on the seventh and eighth sections—.865 of a mile (1.395 kilometers) long—is progressing beneath the Ginza thoroughfare. These links will make connection with the government elevated line at Shimbashi station, to be effected in the spring of 1934, according to the contractor's schedule. Such extensions of the trunk line through the heart of the fashionable shopping quarters of the city, assure a marked increase in subway traffic volume, judging by the ever growing popularity of Tokyo's new rapid transit facility.

The speedy completion of a city-wide underground transportation system, totaling at least 45 miles (80 kilometers) in length, is an urgent necessity for Tokyo in order to relieve the acute traffic congestion experienced to-day throughout the metropolis, in the opinion of experts who recently conducted investigations for the Tokyo city transportation commission. Ambitious plans, therefore, which have been advanced for adoption by yet another independent subway organization, are now under consideration.

Tokyo's First Reaction

In O. D. Russell's column Achi Kochi (There and Here) appearing in the *Japan Advertiser* seven years ago, he describes in no uncertain terms the inception of the Tokyo subway's first link; but the achievements of the builders from that day to this proscribes his blandly amusing comments at that time as not justified when applied to the efficient and practical functioning of the subway to-day. Even the turnstiles he mentions have been dispensed with.

"Well," Achi Kochi observed, "the new Tokyo subway has opened, but the officials are still a little puzzled as to what to do with it.

"Originally intended to be used as a means to conveying passengers from one part of the city to another, the new underground instead is rapidly developing into Tokyo's chief amusement device.

"Every day since the subway has opened great crowds of people line up in long rows at each end of the mile-long line and wait patiently for the opportunity to ride to the other end and back. . . . .

Subway Station beneath Mitsukoshi Department Store. Escalator on left

"Built to relieve congestion in the Ueno and Asakusa districts, the subway has done nothing more than to cause the greatest congestion ever seen in those parts. Whereas, six months ago, people who had no business in Ueno and Asakusa did not go there, now they go to ride on the subway, and if the present pressure keeps up, it is feared that a new subway will have to be built to relieve the congestion of those who want to ride on the present subway. . . .

"Whole parties are taking holiday excursions and outings in the subway. With great lunch hampers, furoshiki and other bundles, they assemble early in the morning at one of the terminals with much bowing, smiles and other indications of merry-making. They wear the inevitable paper rosettes to distinguish themselves as members of certain parties and file uncertainly by the turnstiles as the unctuous host auspiciously provides each with a ten-sen piece.

"The turnstile is the only hazard on the entire journey, outside of the crowds. Our Tokyo co-residents have not yet mastered the intricacies of the turnstile. They are a bit tricky. A spirited push against one arm of the device sends the succeeding arm around so smartly that the client glares around to see who hit him as he instinctively reaches for a geta. . . .

"The fact that you enter the turnstiles on the right also throws out something of a mental hazard for the local talent who invariably turn the revolving doors the wrong way.

"Once inside the cars and the train in motion, the Tokyo subway rider gazes studiously and attentively out the windows into the pitch blackness. They seem to be under the impression that the subway should be accorded the same treatment in this matter that the surface cars receive. Besides it is very polite to look out of the window and profess enjoyment of the scenery, as they are passengers on the honorable system which, of course, was invented in Japan."

Serves Department Stores

Along the route of the subway, finished portions of the line have underground outlets leading into basements of several department stores as well as other contiguous buildings frequented by shoppers. After completion to Shimbashi, the subway will have hooked up nearly all the well-known department stores of the city, thereby serving, so to speak, as their horizontal escalators.

Basements of buildings which are provided with covert ways opening directly to the subway corridor are:

At the Asakusa terminus—under the Tobu railway depot and Matsuya department store, Asakusa branch; beneath the restaurant building under management of the subway company.

At Ueno station—below Government railway terminal; 300 foot underpass to subway company's Ueno store.

At Ueno Hirokoji subway station—Matsuzakaya department store, Ueno branch.

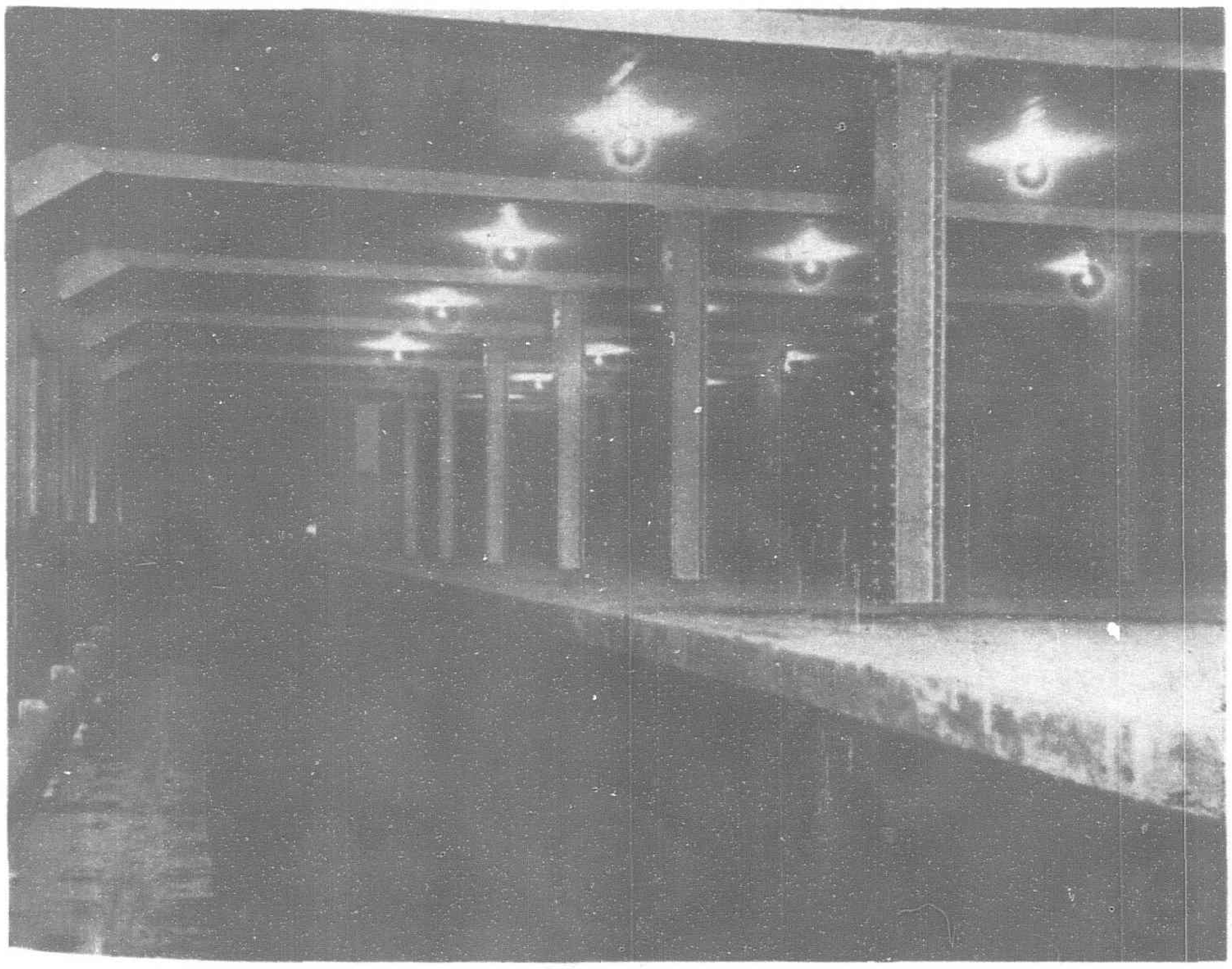
At Kanda station—Kanda elevated depot; under the company's Suda-cho store.

At Mitsukoshi subway station—Mitsukoshi department store; beneath the Hon-cho store belonging to the subway company.

At Nihombashi subway station—Shirokiya department store; new Takashimaya department store.

At Kyobashi subway station—new Meiji-ya provisioners building.

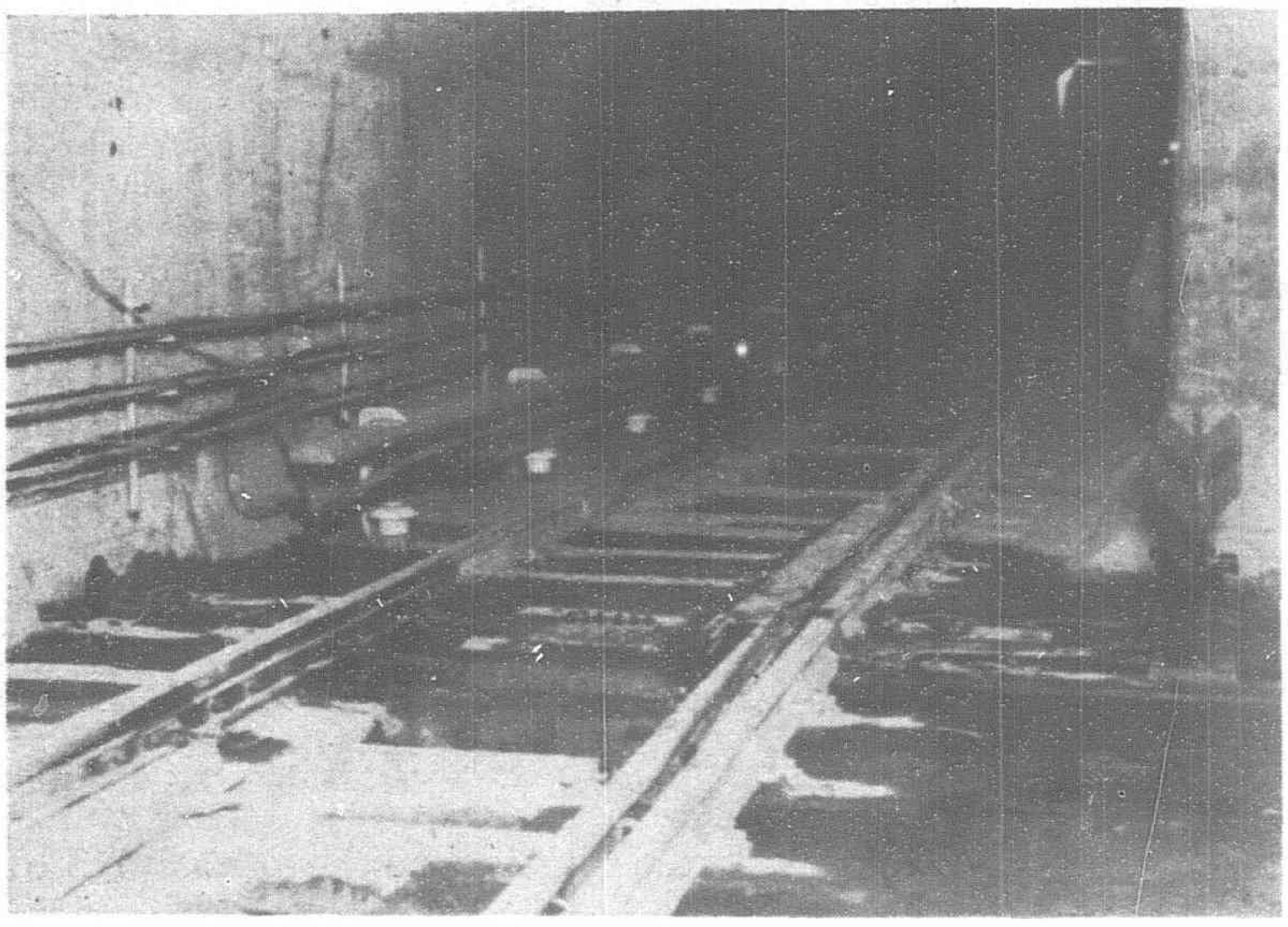
The underground way-stops at Mitsukoshi, Nihombashi and Kyobashi have block-long corridors or mezzanines the width of the street above. They lie between the train platform and the numerous exit stairways leading to the street. This feature is said to be an innovation, a novel departure from standard subway construction technic employed elsewhere. It has even been suggested that the ample space available on both sides of the long promenade may well be



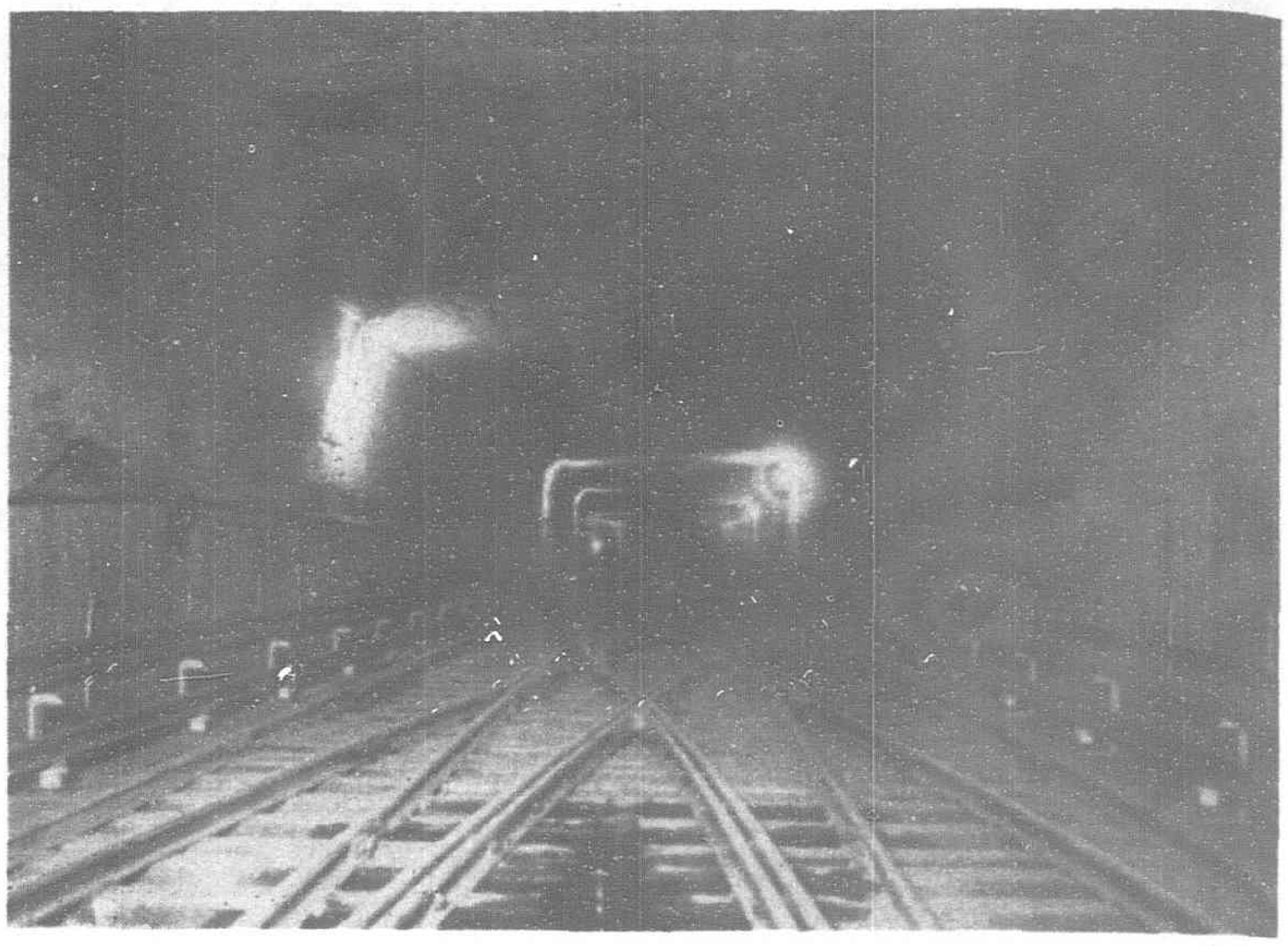
Part of Nihombashi Station platform completed December, 1932 utilized for small specialty shops dealing in various commodities constantly in popular demand.

Beside these direct connections to buildings along the subway's right-of-way, work on underpasses to the Keisei electric railway (line from Tokyo to Narita, Chiba Prefecture, due East from the city) at Ueno station and to the Matsuya department store near Owari-cho station are now being constructed.

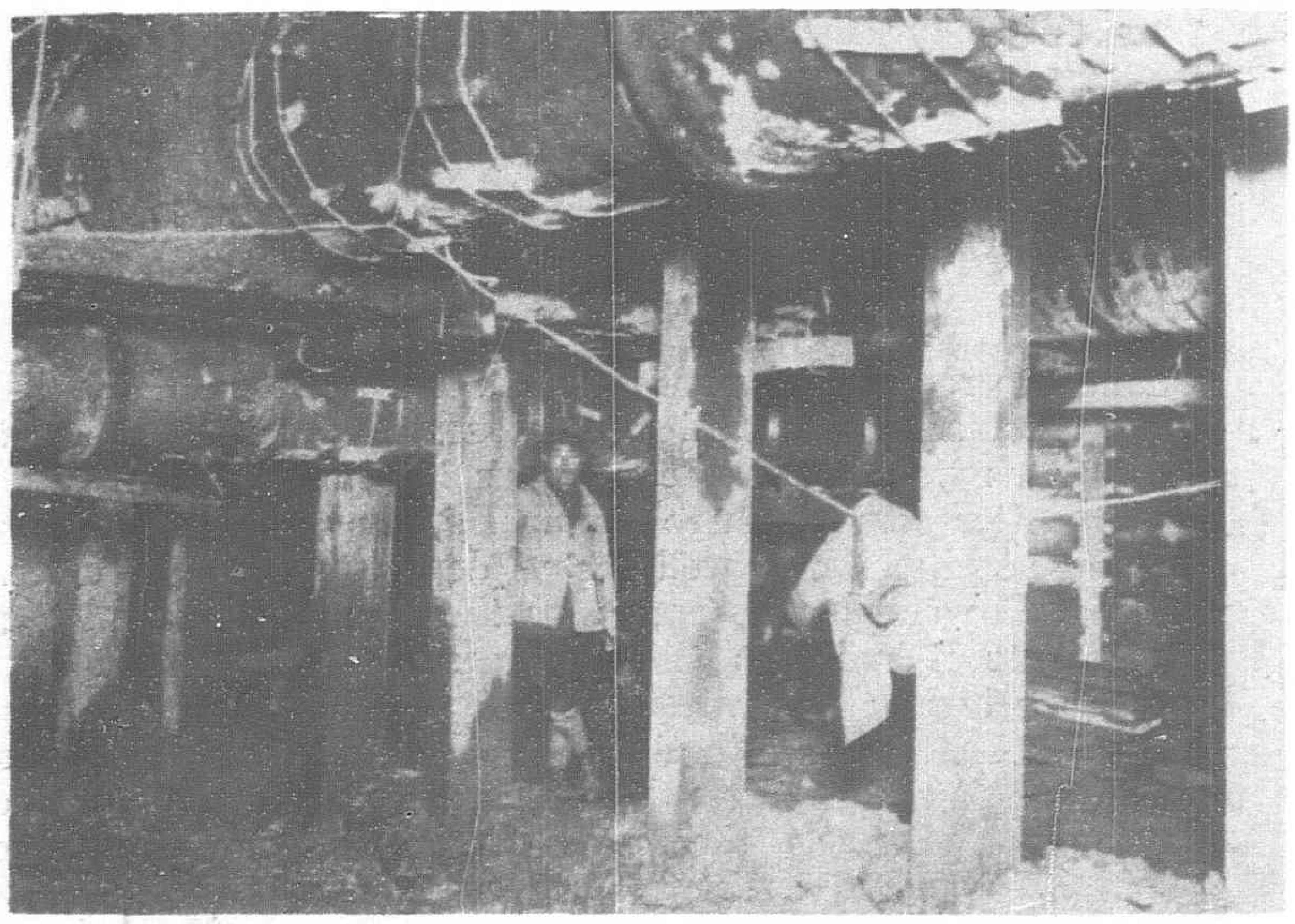
The main line of Tokyo's underground railway, as projected, will pass through Shinagawa and Gotanda, both on the southern loop of the beltline, and thence continue to Magome, Omori Ward,



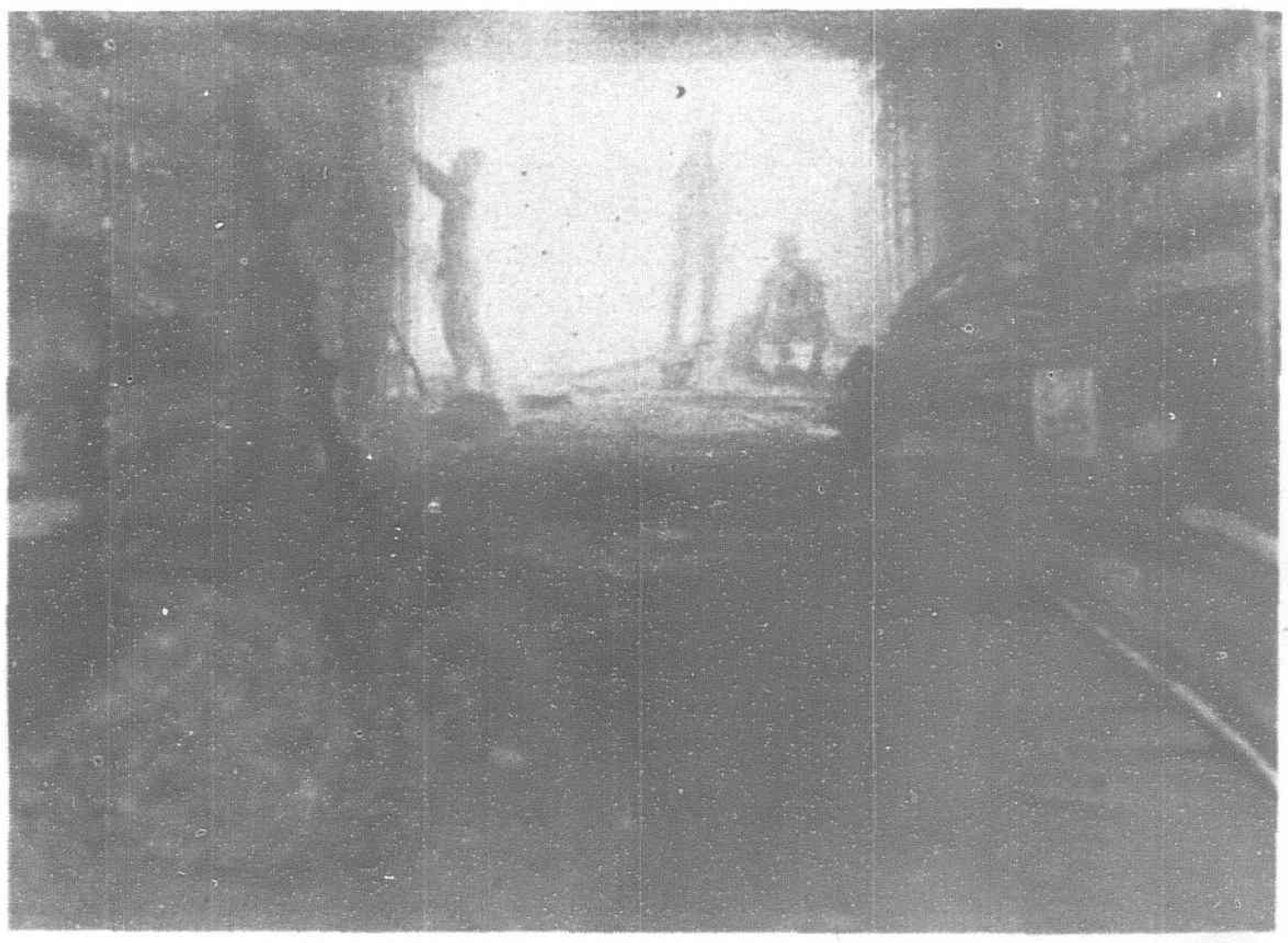
Automatic Spring Switch along New Section of Subway. Switch snaps back into place 10 seconds after wheel flanges have touched it



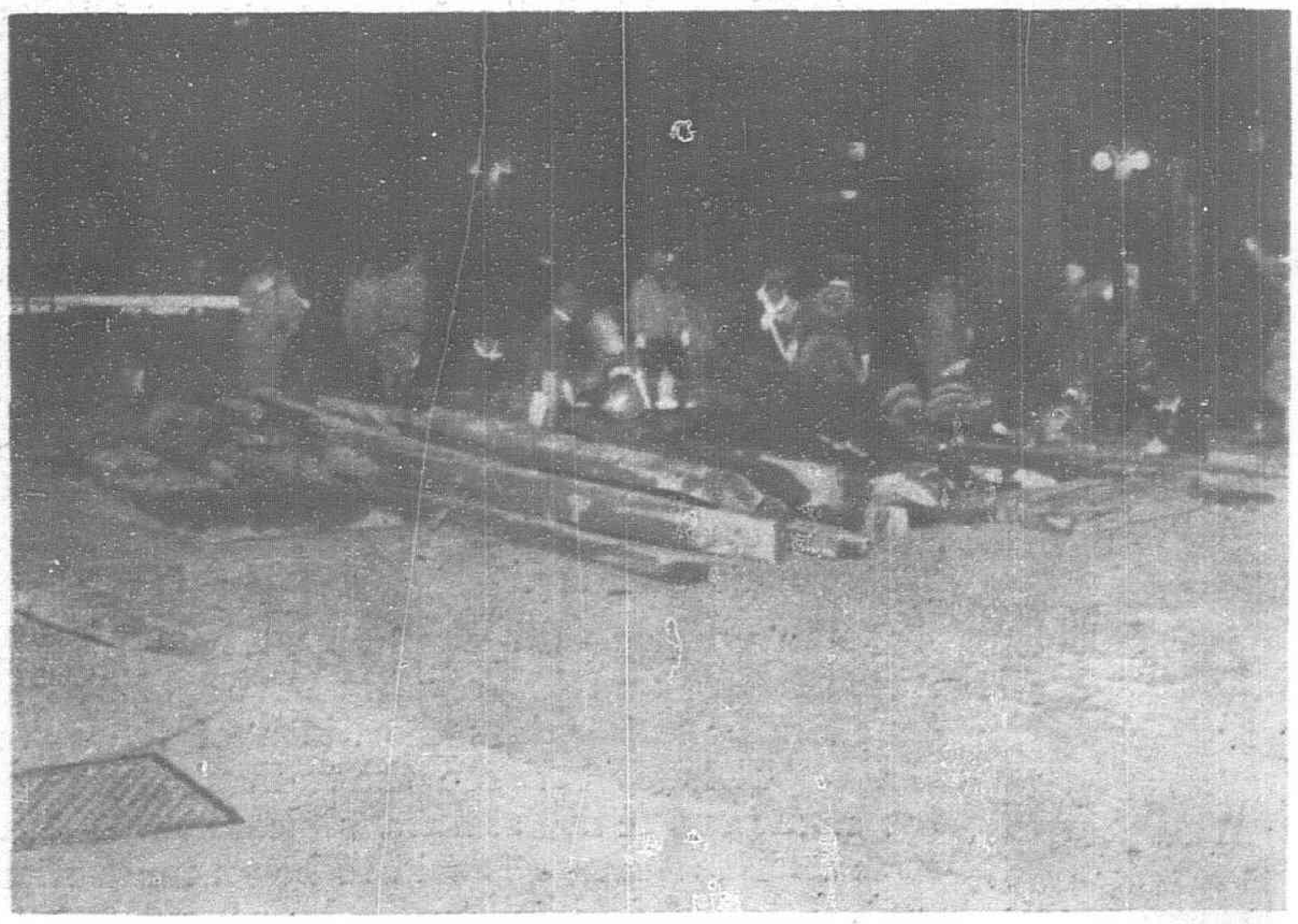
Looking toward present Southern Terminus of Subway at Kyobashi Station, opened December, 1932.



Sub-Surface Structures near Kyobashi Station supported by wood while Tunnel Excavation is in progress

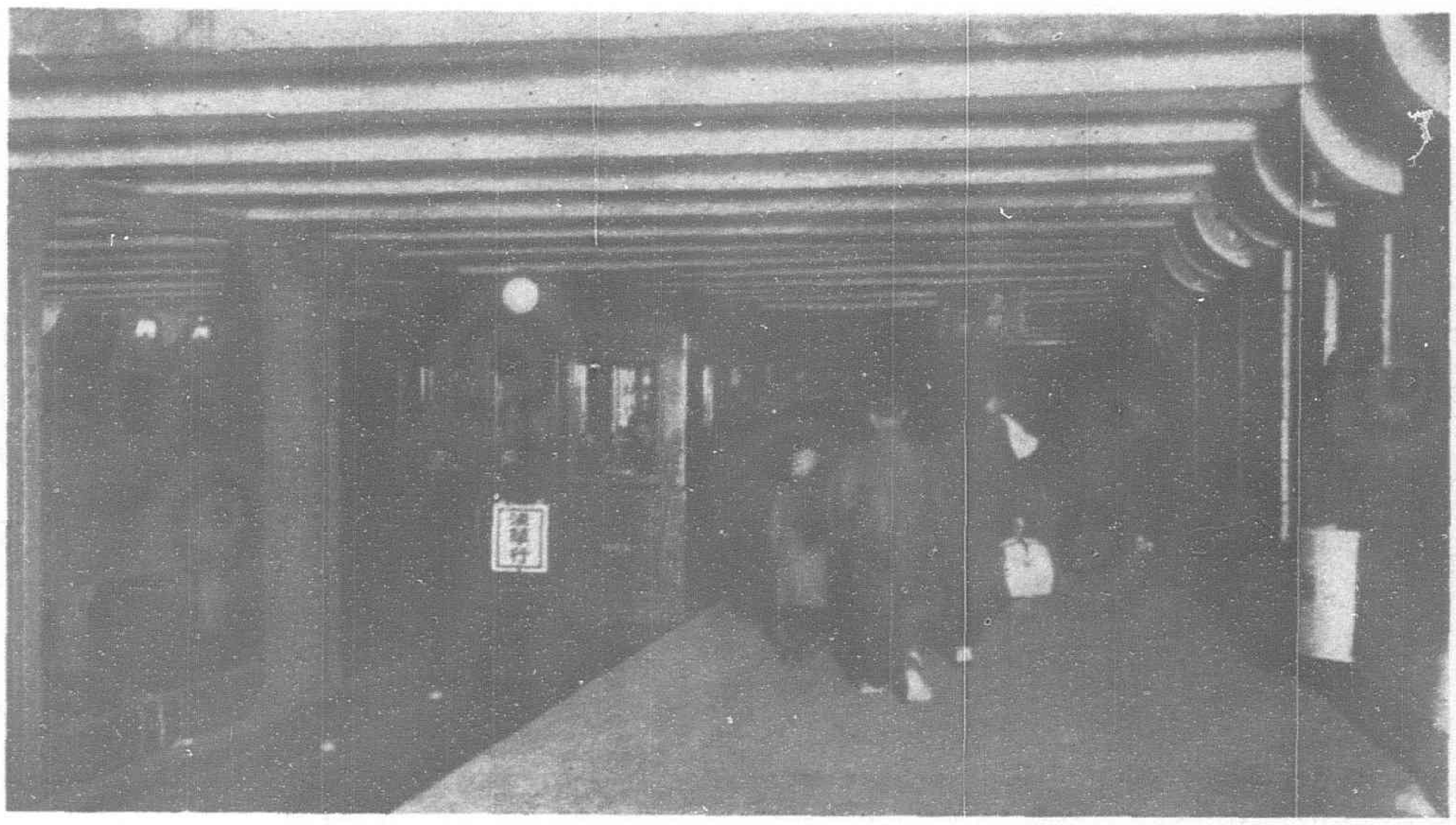


Construction of Underway at Approach to the New Kyobashi Subway Station



Tearing up the street at midnight for Subway construction at Kyobashi Intersection

Initial street digging at night, Kyobashi, 3-Chome, a continuation of the Ginza Thoroughfare where car sheds and repair shops are to be built. Eventually, a further extension from Magome to Ikegami in the same ward is anticipated. The route from Asakusa to Shinagawa covers 8.36 miles (13.487 kilometers), and the total building costs for this distance is expected to top at least Y.35,000,000.



View of Ueno Station and Subway Car being loaded

Passes Under Waterways

During the work of construction from Asakusa to Kyobashi (bridge), the present termini of the subway, it was found necessary for the line to pass underneath three of the many waterways intersecting the city of Tokyo. Construction methods in boring under these waterways were as follows:

Kanda river: To enable the free passage of small craft during construction of the tunnel, a steel trough 20 feet wide was placed in the river bed, which is all of 80 feet in width at this point. Beneath this trough a two-track, box-shaped tunnel was dug across by the so-called open cut method. An arch-type permanent highway bridge was then erected over this subway structure to replace a temporary bridge in use since after the earthquake of 1923.

Ryukan canal: A two-track, box-shaped tunnel was dug directly under the 30 foot plate-girder bridge spanning the canal. At all times the road surface was kept undisturbed and in its normal condition, even while both bridge abutments were removed temporarily in constructing the tunnel below.

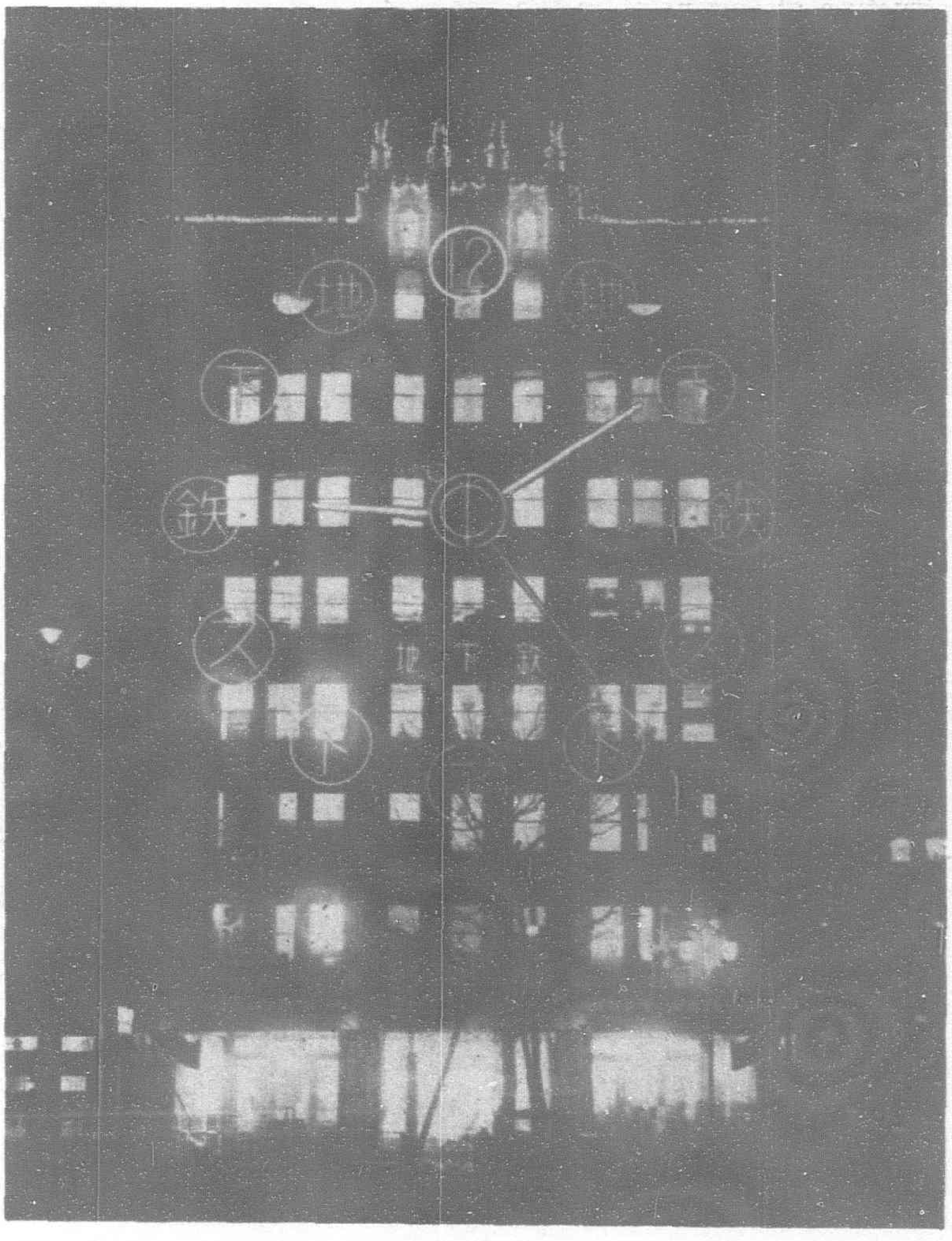
Nihombashi canal: After the total width of the canal at both upstream and downstream sides of the bridge was shut off by cofferdams for a distance of 150 feet, a two-track, box-shaped tunnel was dug by the open cut method.

Future construction for Tokyo's subway will be much facilitated by the experience gained in laying former sections. Hence greater economy as well as speed can be achieved from now on, officials declare.

On December 24, 1932, the Tokyo underground railway company completed work of construction on the stretch from Mitsukoshi to Kyobashi (bridge), and now the entire line being operated to this point has in reality become an integral part of the city's rapid transit system. Construction along this stretch was divided into two parts, viz., the section between Mitsukoshi and Nihombashi and that between Nihombashi and Kyobashi. The former section was built by Okura & Company, the latter by Hazama & Company.

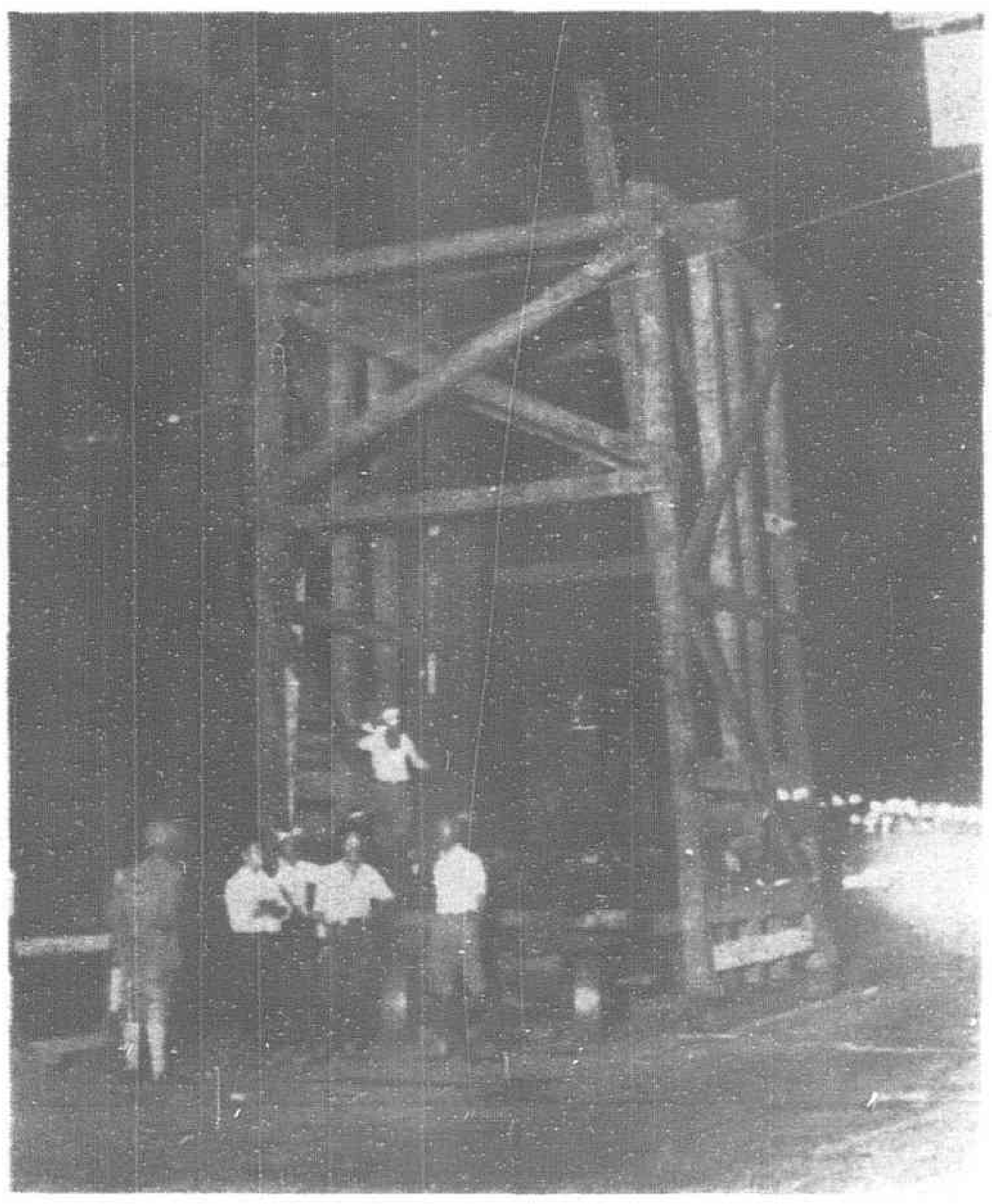
Physical work on both of these sections was begun October 1, 1931, and completed December 24 of the following year. As in the past the method of construction employed for this new stretch

Suda-cho Store near Kanda Subway Station having underpass to basement

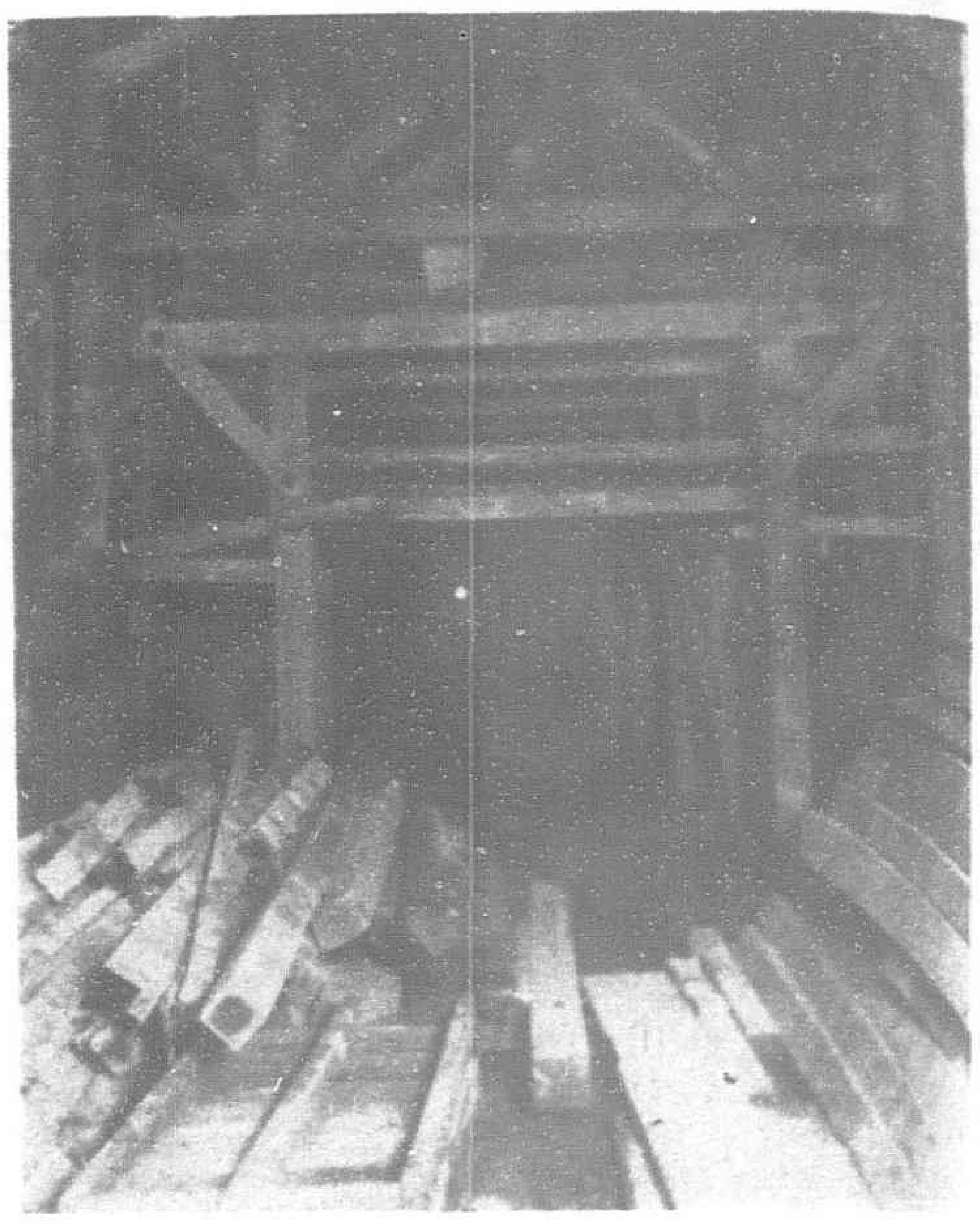


Ueno Store at night in front of Subway Station with Underground Passages to basement

Completed Section of Tunnel Structure under Nihombashi Canal



Work continued all night at the Kyobashi Intersection



Subway Tunnel under construction beneath Nihombashi Canal

was the cut and cover method, except at waterways, in which cases the open cut method was used. The tunnel structure along the right-of-way consists largely of reinforced concrete, whereas stations also are built of ferro-concrete in addition to riveted steel frames. Such treatment is now considered to be standard in building Japanese subways.

Although the tunnel structure under Nihombashi canal was laid at the upstream side of the bridge, thus avoiding Nihombashi itself, it required considerable time to complete the boring due to the hardness of the sub-surface stratum of the river bed. Difficulty was encountered in driving and extracting sheet piles, and it took a much longer time than was expected to lay the tunnel structure at this point in the line.

At Nihombashi Station

Nihombashi station is connected with the basements of the two large department stores, Shirokiya and Takashimaya. Kyobashi station has an underpass to the basement of the new Meiji-ya building, recently opened. On the mezzanine or promenade of Nihombashi station some space is allotted for the installation of electrical substation equipment, such as that in use at the Kanda substation.

Line.—The length of the recently completed stretch of subway is about .739 of a mile (1,187 meters) and the total subway length in operation to-day is about 4.03 miles (6,500 meters). The maximum grade of the line is 2.5 per cent and the minimum radius of curves 490 feet (150 meters).

Construction Work.—The geological features of these two sections are sand with clay or clay with sand or shale. A general description of the construction work of these sections follows:

1. TUNNEL UNDER NIHOMBASHI RIVER

The tunnel was dug on the upstream side of Nihombashi (bridge), avoiding abutments and piers.

The stream was blocked effectively by cofferdams held by sheet-steel piles.

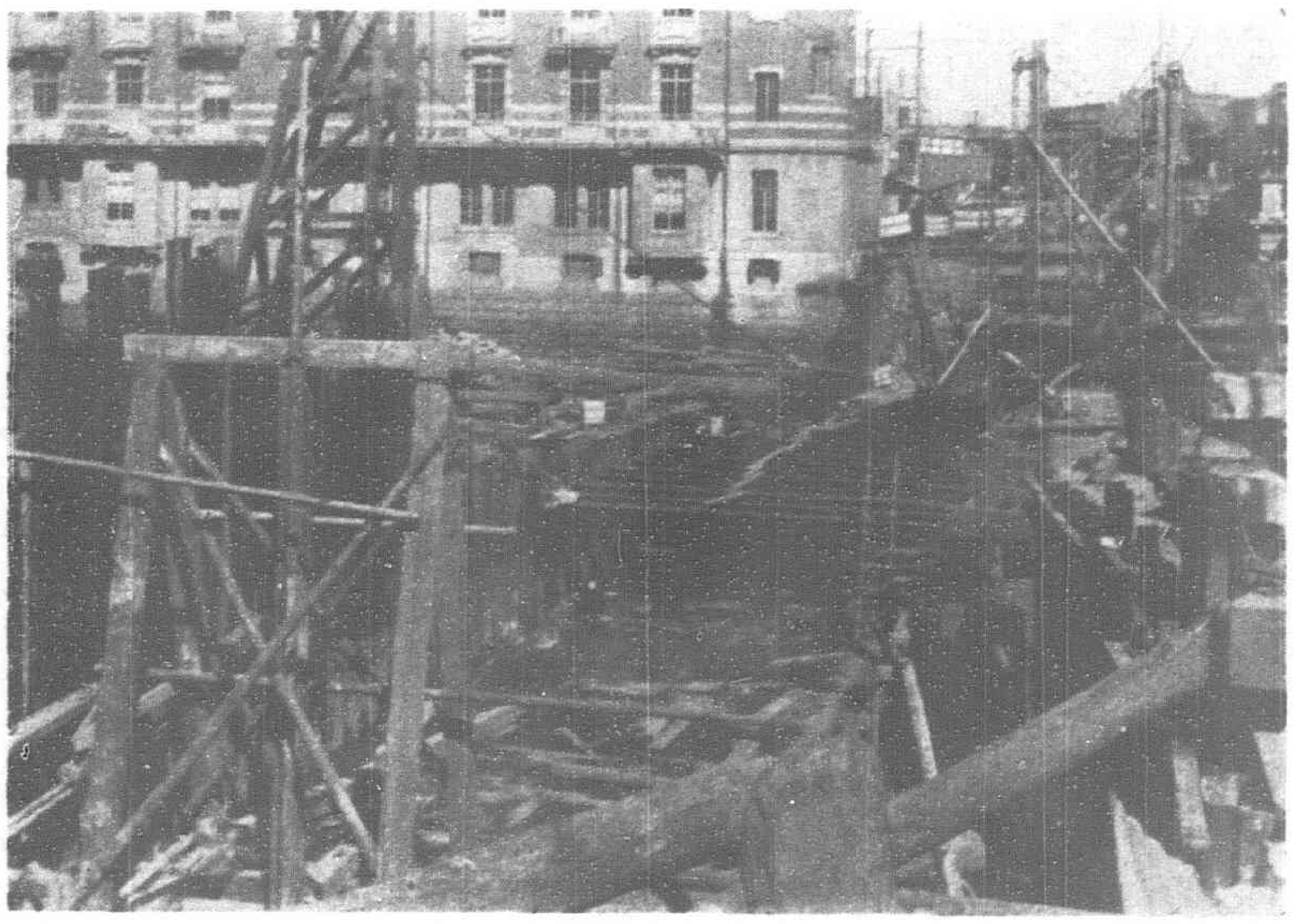
After pumping out the water between the two dams, the sheet-steel piles were driven along both sides of the tunnel to serve as a protective barrier from cave-ins, and then the usual excavating process was carried out without decking.

2. REGULAR TUNNEL CONSTRUCTION

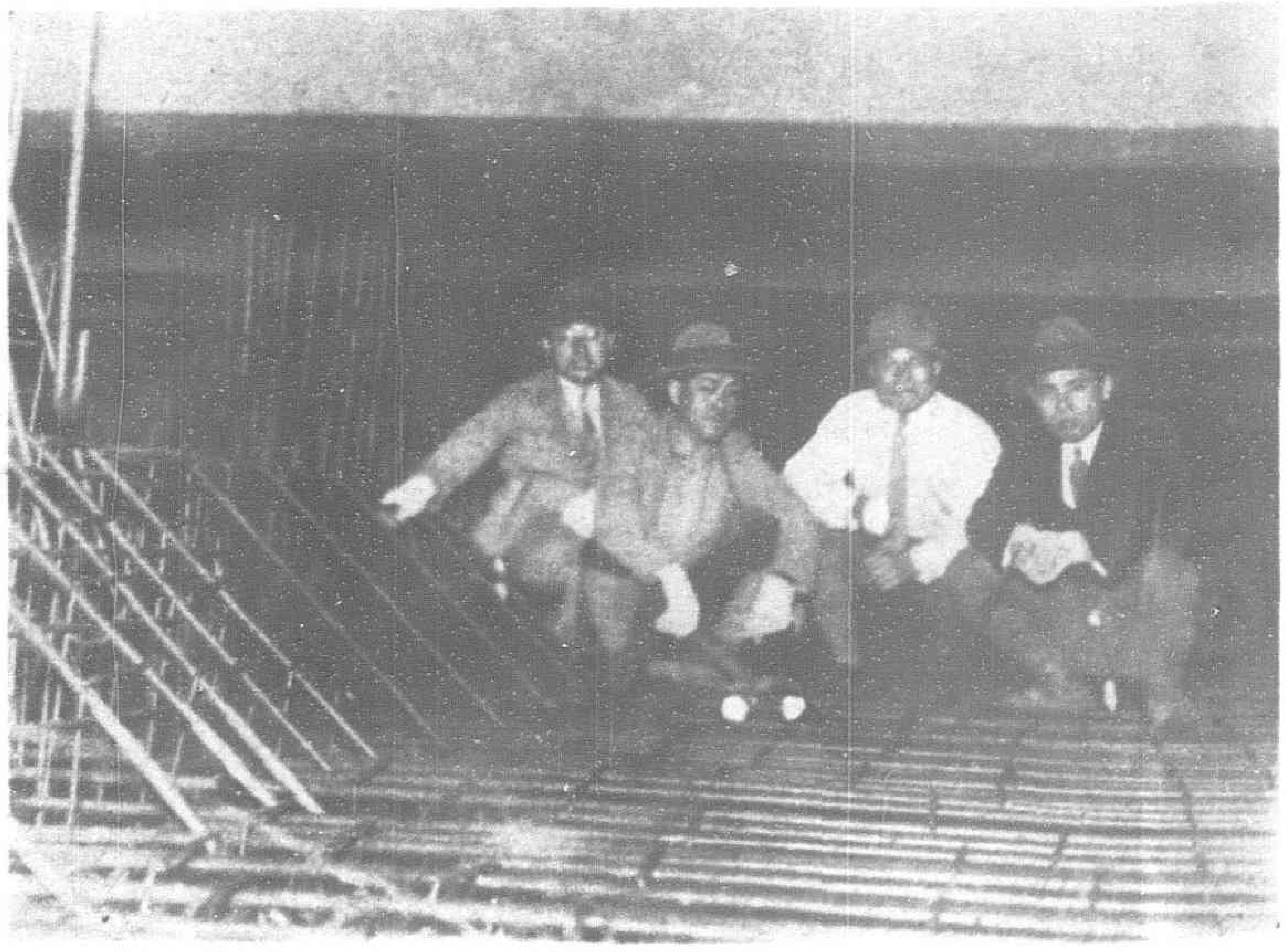
The construction method for the regular tunnel portions of these two sections was practically identical with that employed in putting down previous sections on the route.

(*a*) *Steel-soldier I-pile driving.*—Steel I-piles were driven along both sides of the tunnel under construction, with additional intermediate I-piles at station locations to resist extra heavy loads caused by long overhead spans. The normal distance between these I-piles is 39.37 inches (1 meter).

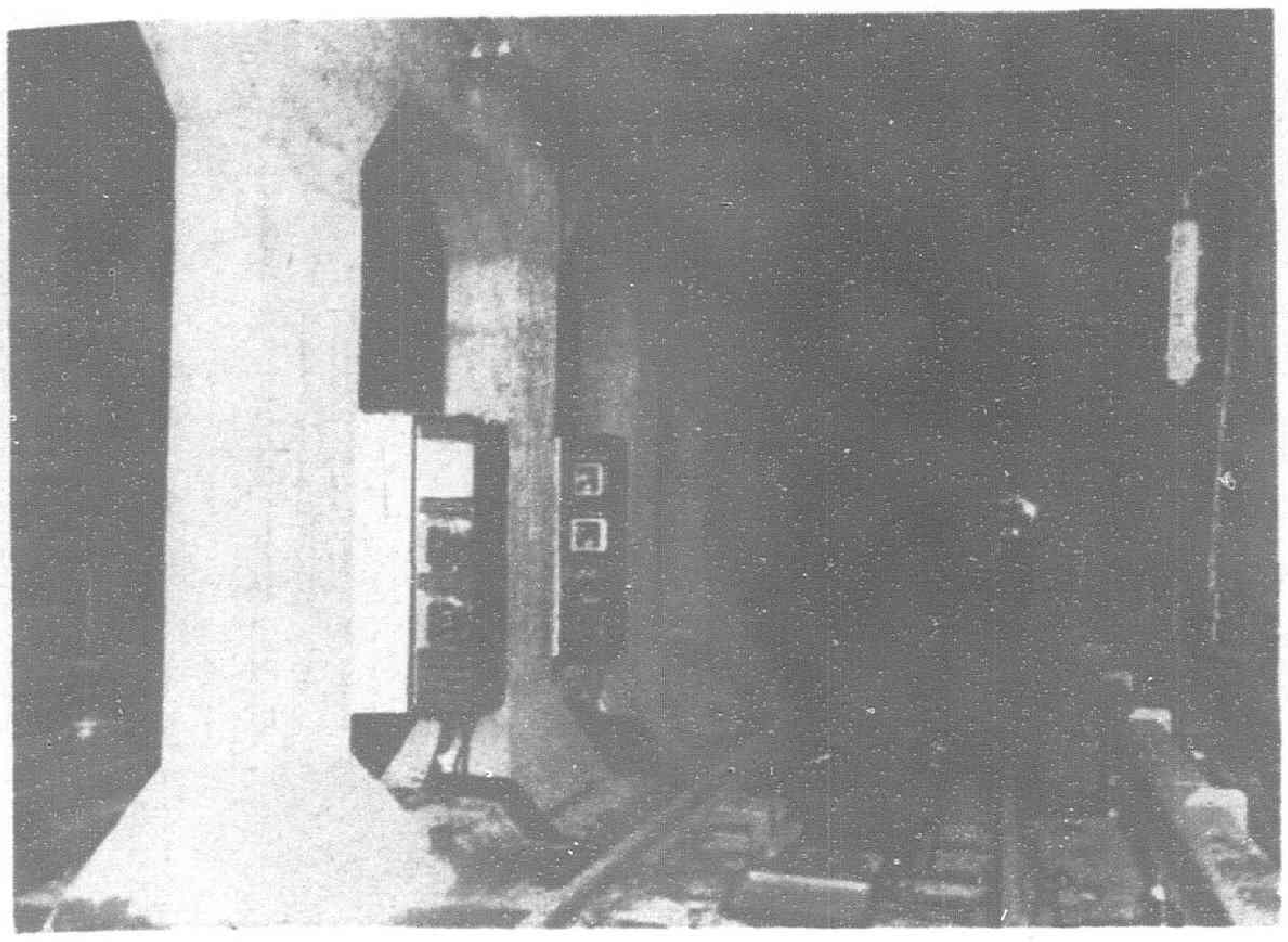
(*b*) *Deck covering.*—After steel-soldier I-piles were driven into the ground, and the earth for about 39.37 inches (1 meter) was



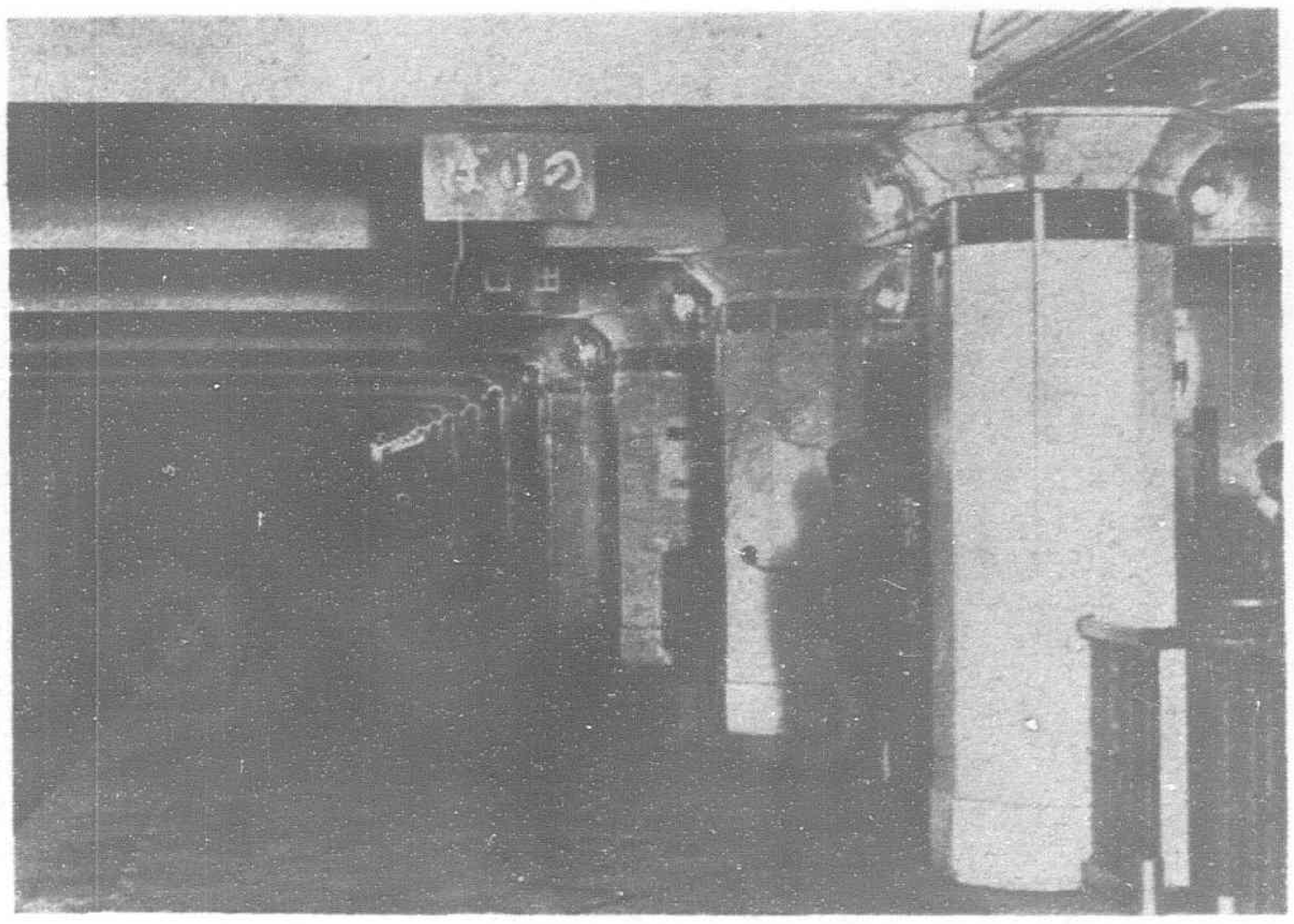
Digging Tunnel by Open Cut Method beneath Upstream Side of Nihombashi (bridge) after draining canal water by cofferdams 150 feet apart



Arrangement of steel reinforcements on Tunnel Floor along new section of the Subway recently opened



Signal Lights and Automatic Train Stopper Apparatus along New Stretch between Mitsukoshi and Kyobashi



Ueno Hirokoji Station Platform Underneath the Matsuzakaya Department Store

removed, I-piles on both sides of the tunnel structure were connected with steel channels on their inner sides and with angular pieces on the outer side. Transverse steel I-beams for road decking were riveted onto these channels and angles. Wooden planking was then laid on these transverse steel I-beams.

(*c*) *Excavation.*—After deck coverings were laid, excavation was accomplished by means of a hoisting apparatus placed on the street level. For the hoisting equipment, an inclined skip hoist was used along the course of the 1st section, a bracket elevator with an endless chain for the 2nd and 3rd sections, and a vertical moving bracket elevator along the 4th, 5th and 6th sections. The latter is being used also for work now underway. With the progress of further excavation, wooden horizontal, sheet-steel plates were installed between the steel-soldier piles or spiles.

Details of Construction

All sub-surface structures, water and gas pipes and other impedimenta, were suspended by decking beams and thus protected from possible injury. Some of the water mains were moved temporarily to areas not necessitating excavation and others permanently imbedded when moved.

(*d*) *Waterproofing.*—After excavating was completed, a gravel covering 3.94 inches (100 mm.) in thickness was laid on the floor of the tunnel. A layer of concrete also 3.94 inches (100 mm.) thick was poured on top of the gravel.

On wooden boards which were set up in front of the former wooden sheeting, mortar was blown on to a thickness of 1.26 inch (32 mm.) When this mortar was hardened or condensed, three layers of juit burup (a close-woven fabric) and asphalt were packed on its surface. Finally, on top of the structure, concrete to a thickness of 3.94 inches (100 mm.) was poured to protect the watertight material beneath. At some places a concrete wall about 11.79 inches (300 mm.) thick was constructed on the horizontal wooden sheeting, upon which waterproof material had already been laid.

Street work at Maki-cho, Earth being hauled off in Trucks after elevation from Tunnel Excavation

(*e*) *Tunnel structure.*—After waterproofing of the bed and side walls was complete, riveted steel frames were erected, and then reinforced concrete was poured to fill in the structure. The structural character of stations, electrical substations and parts beneath buildings as well as retaining walls of rivers or canals were fortified by reinforced concrete and riveted steel sections; whereas other places were treated with reinforced concrete only.

(*f*) *Ventilation shafts.*—Shafts for the purpose of ventilating with natural fresh air were built into the sidewalk at intervals of 328 feet (100 meters).

(*g*) *Backfilling.*—After the tunnel body was completed, all sub-surface structures were reconstructed, and replaced in cases where they had been moved temporarily. Some of them had been supported by wooden grilling or concrete foundations. Then the tunnel structure was buried by filling in with earth, and the decking as well as steel-soldier I-beams were removed. Next the surface car tracks and the road pavement were relaid as originally.

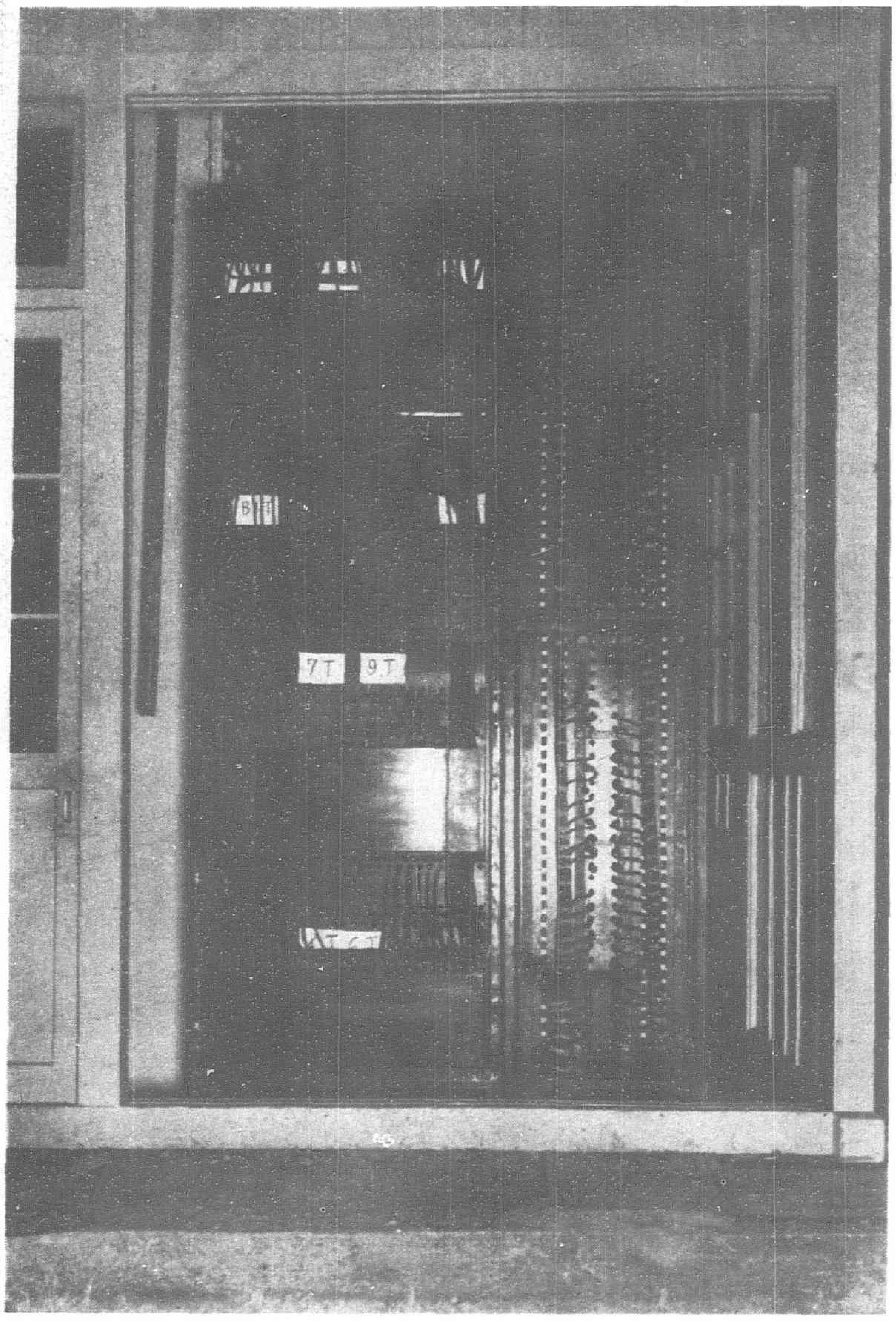
3. In laying the Tokyo subway line between Mitsukoshi and Kyobashi stations, the itemized quantity of various materials used is as follows:

Item	*Quantity*
Steel-soldier I-beams	3,099 pieces
Steel sheet piles ..	719 ,,
I-beam decking ..	972 ,,
Deck covering	163,000 sq. ft. (15,267 m2)
Excavation	5,580,000 cu. ft. (158,778 m3)
Concreting	1,189,000 cu. ft. (33,070 m3)
Setting of riveted steel	2,164 tons (2,423 tons)
Waterproofing	492,000 sq. ft. (45,652 m2)
Backfilling	2,020,000 cu. ft. (57,327 m3)

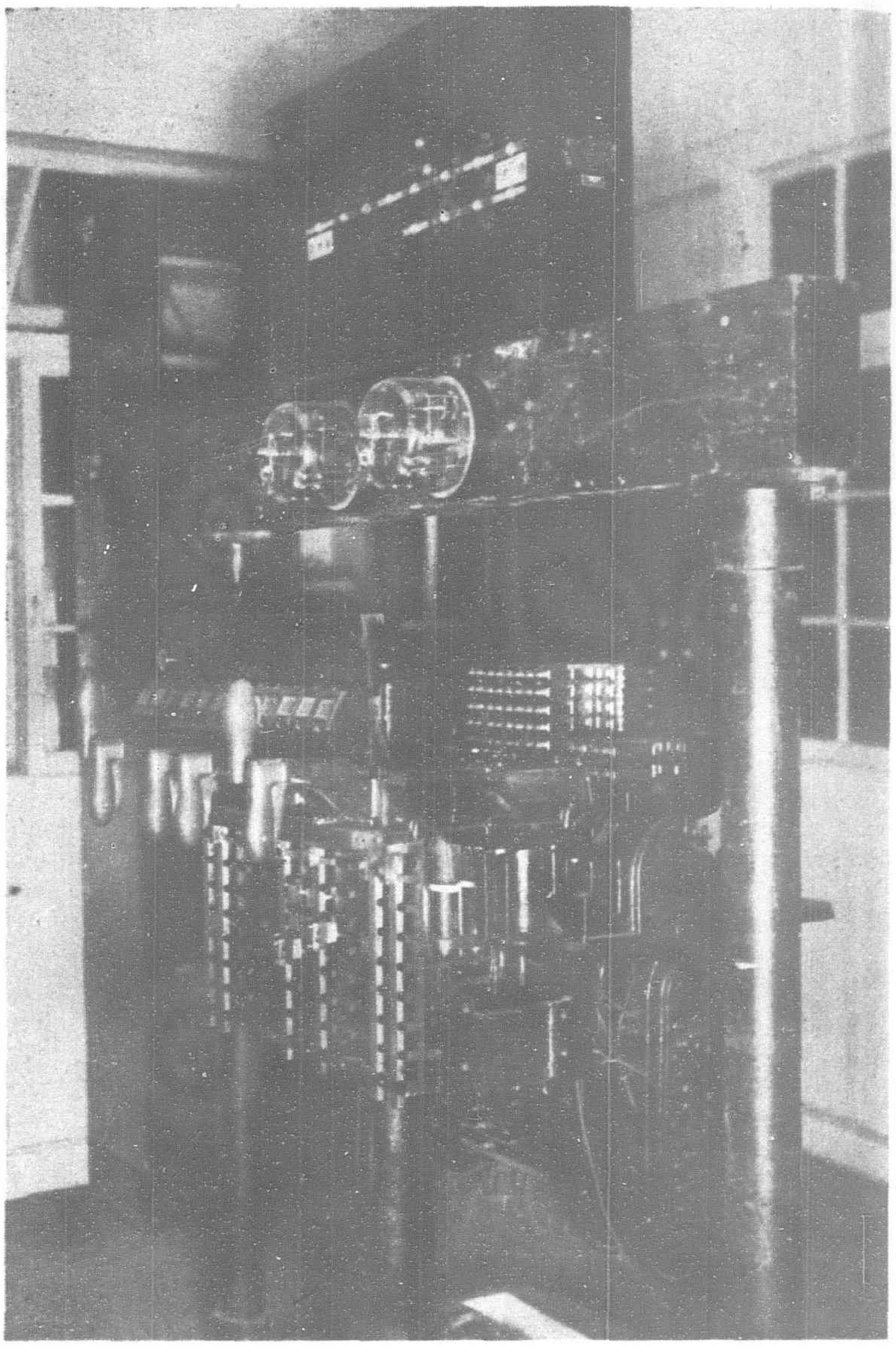
Decorative Effects

4. STATIONS

The decorative effect and finish of both Nihombashi and Kyobashi stations is done in the same style as that of the station at the Mitsukoshi department store. In order to harmonize the



Interior view of Signal Cabin at New Kyobashi Subway Station



Close-up of Signaling Apparatus in Signal Cabin, Kyobashi Station

appearance of all the subway stations, similar methods were carried out with each one. Promenade and platform floors are laid with cement-mortar. A white-tile, dotted line faces the platform floor about two feet from its edge, between which space cement-mortar studded with diamond beton (a concrete of lime, sand and hydraulic cement) is laid to prevent foot-slipping in passing in and out of subway cars. To brighten station corridors and aid in illumination, oil-filled white plaster covers all ceiling surfaces.

Side walls along the platforms, which are 298 feet (90 meters) long, are faced with vari-colored tiles over their lower reaches, while white plaster covers the upper surface.

Mezzanines were built to cover the entire area of both stations, as at Mitsukoshi station. The side walls of these promenades also are decorated with tile along their lower surfaces and covered with plaster above. Steel-girder supporting columns on the platforms are colored with silver paint. The size of advertising poster cases against the walls do not vary from those displayed in the other stations along the route of the subway.

With a special eye toward harmony with respect to the characteristic wares of each store, special features in the decorative scheme of the passages to the Shirokiya and Takashimaya department stores were designed. An interesting contrast resides in the double display of these two big stores—one at each end of the same station.

5. TRACKS

(*a*) All double track right-of-way with solid concrete bed having open drain in center and water pipes of .984 of an inch (25 mm.) and 1.97 inch (50 mm.) are installed for cleaning of tunnel structure and tracks.

(*b*) Track gauge is standard, 56.5 inches (1,435 mm.) wide, and rails are P.S. type, 39.37 feet (12 meters) long, weighing 10,100 lbs. (50 kgs.) per 3 feet, 3.37 inches (1 meter), which were rolled at the Yawata Iron foundry, Kyushu, Japan. Rails are fixed to sleeper by cut spikes.

(*c*) All sleepers, cut from "asunaro" (Japanese express), are laid at the ratio of 21 for one rail. The cross-section measurement of a sleeper is 7.87 × 5.9 inches (20 × 15 cm.). Their length is variable. depending upon the place where they are laid.

(*d*) Tie-plates with 1/20 slope were used between sleeper and rail. Special tie-plates connecting both ordinary rail and guard rail were used on guard-rail section.

(*e*) Four or five anti-creepers were fastened to each rail to prevent creeping of running rails.

(*f*) No. 8 scissors crossing was installed near Kyobashi station.

Electrical Equipment

6. ELECTRICAL EQUIPMENT

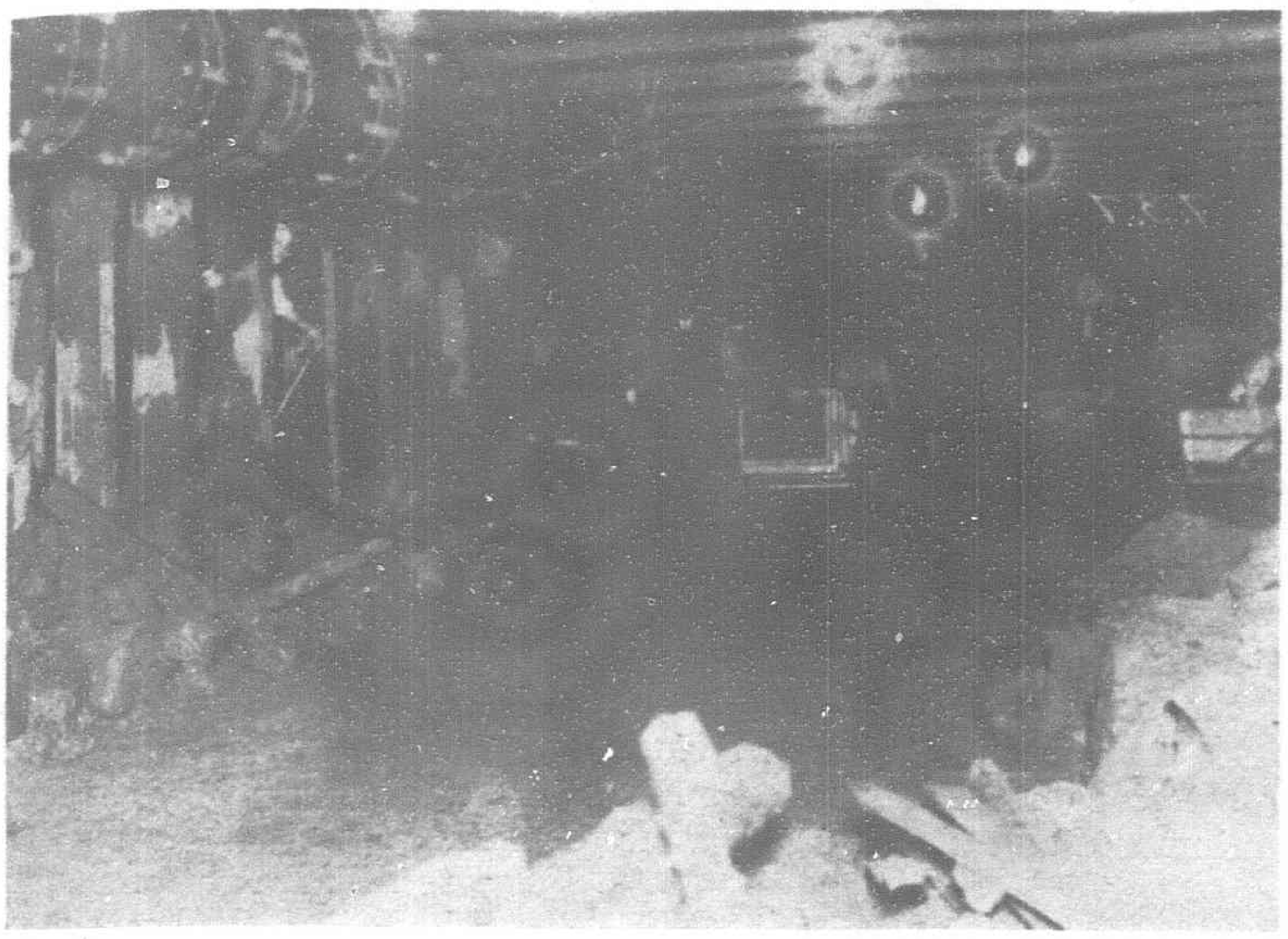
(*a*) Total third-rail extension within this section is 7,355.65 feet (2,496 meters). These third rails are P.S. type 50 kg/m and were made at the Yawata iron foundry.

Principal components of the third rails are :

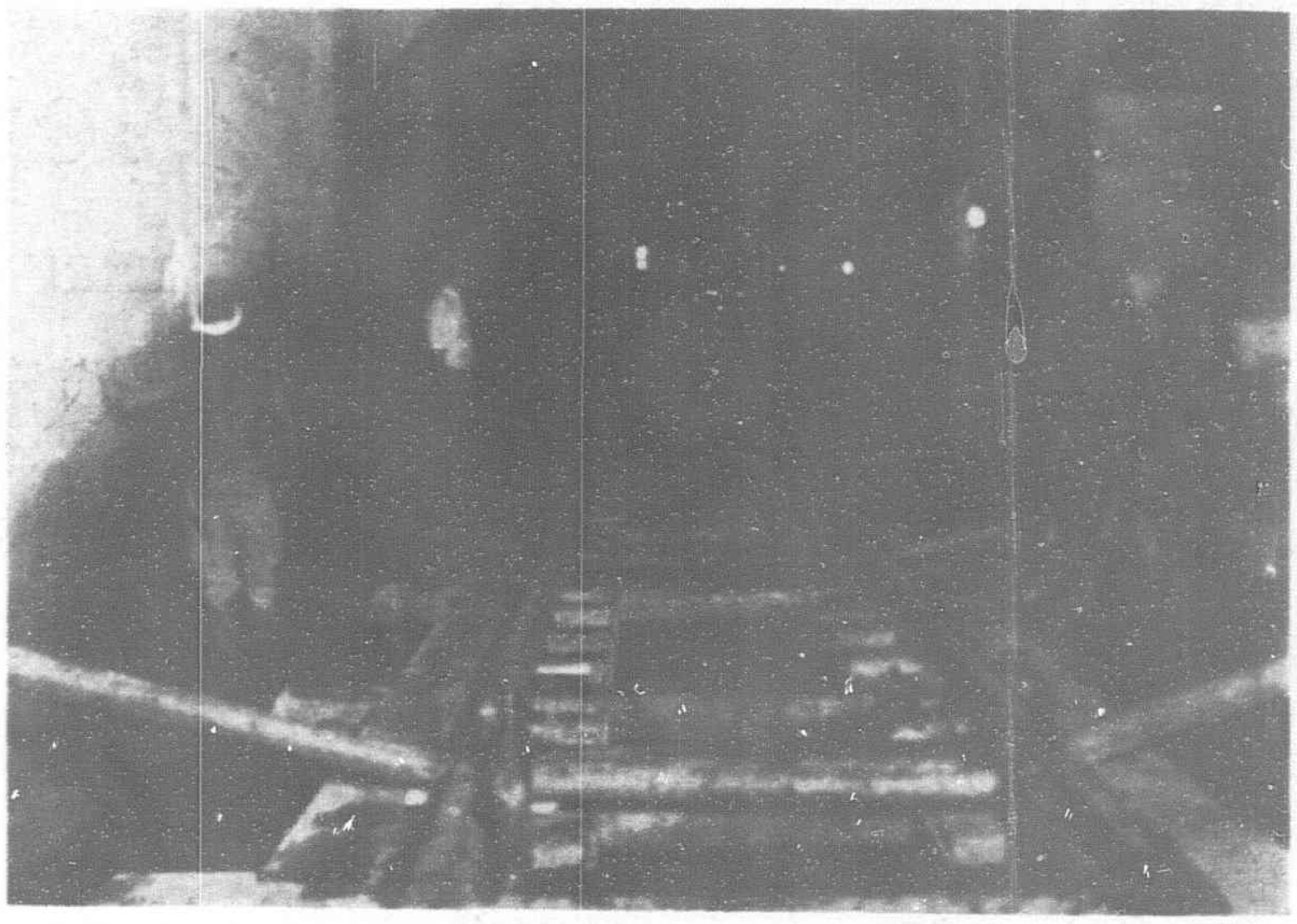
Carbon	.04
Mn	.15
P	.012
S	.025
Electrical resistance is	6.52

(*b*) *Lighting at stations.*—The number of electric lamps installed is as follows :

Kyobashi station	250
Nihombashi station	280
Along right-of-way	100



Sub-Surface Structures at Kyobashi 2-Chome where Tunnelling was under way



Rail laying under Maki-cho between Nihombashi and Kyobashi Subway Stations

(*c*) *Interlocking apparatus.*—The interlocking equipment which had been installed at Manseibashi station was improved and moved to Kyobashi signal cabin. The apparatus which are handled in this cabin are as follows :

Switch for scissors crossing	4
Signal	3
Automatic train stopper	3

One of these four switches is of the spring type. The spring switch is installed at a trailing side and is always attached to a stock rail. It is moved by the train's wheel flange, and the switch snaps back into place 10 seconds after the train has passed. In consequence of these details, much effort was expended in completing the complex line distribution of the signal cabin, which is shown in the accompanying illustration.

(*d*) *Signal plant.*—Automatic signals and automatic train stoppers installed in this stretch of the subway are the same as those used previously. Their number for the new link is :

Block signal apparatus	9
Semi-automatic signal	4
Automatic train stopper	10

(*e*) *Electric wire.*—Kinds of electric wire used and their respective total lengths are :

3 core electric wire for electric lamps and power.
2 lines 8,202 feet (2.5 kms.)
2 ,, electric wire for signaling.
1 line 4,265 feet (1.3 km.)
13 pair electric wire for telephone.
1 line 4,429 ft., 2-in. (1.35 km.)

The personnel of the Tokyo underground railway company comprises Dr. Ryutaro Nomura, President ; Tokuji Hayakawa, Managing Director ; Yukichi Aiko, Manager ; Hirosaburo Sugi, Chief Engineer, and Yukuma Totake, Chief of the Research Department.

B.T.H. Turbo-Alternators for China

Showing transportation through Shanghai of one of the Electrical Stators. Scene on right is on Shanghai's Bund

THE British Thomson-Houston Company has recently manufactured two turbo-alternators at Rugby Works for the new power plant of the Hangchow Electricity Works at Zahkou, Chekiang These turbo-alternators each have a maximum continuous of rating 7,500/8,900 kw., 9,375 kva., 80/95 per cent power factor, three-phase, 50-cycles, 13,200/14,000-volts. They run at 3,000 r.p.m., the steam conditions being 350 lb. per sq. in. gauge pressure, total temperature 720 degrees F. and vacuum 28.5 inches.

A scene during the transportation of one of the electrical stators through Shanghai is shown above Owing to the disorganization of the railways at the time on account of the political disturbances, it was necessary to take the stators by road from Yangtszepoo to the Shanghai South Station and the difficulties of loading at the South Station are indicated by picture on left. The weight of each stator is about 20 tons and when crated, as shown, 21½ tons.

Harbor Development at Tokyo

By *W. HARVEY CLARKE, Jr.*

Even with a commodious harbor lying sheltered close at hand by the mouth of the Sumida where it empties into the upper reaches of Tokyo Bay, the rank and file of Tokyo cosmopolites with one accord have never given deserving prominence to those advantageous aspects of such potential significance manifest in the possession of a readily accessible port at their very front door, although from far and wide within recent months the city of Tokyo itself, as chief Far Eastern metropolis, has engendered its due share of publicity.

In spite of the seeming apathy towards Tokyo's reputation as a port displayed by its people, the past decade has witnessed a rapid development in harbor facilities, and, in volume as well as value of both domestic and foreign trade, the Japanese capital today stands fifth among the leading ports of the Empire.

Though Tokyo holds an important place as a Japanese port why has the harbor of Tokyo been without public repute for so many years? The following reasons have been advanced by city officials:

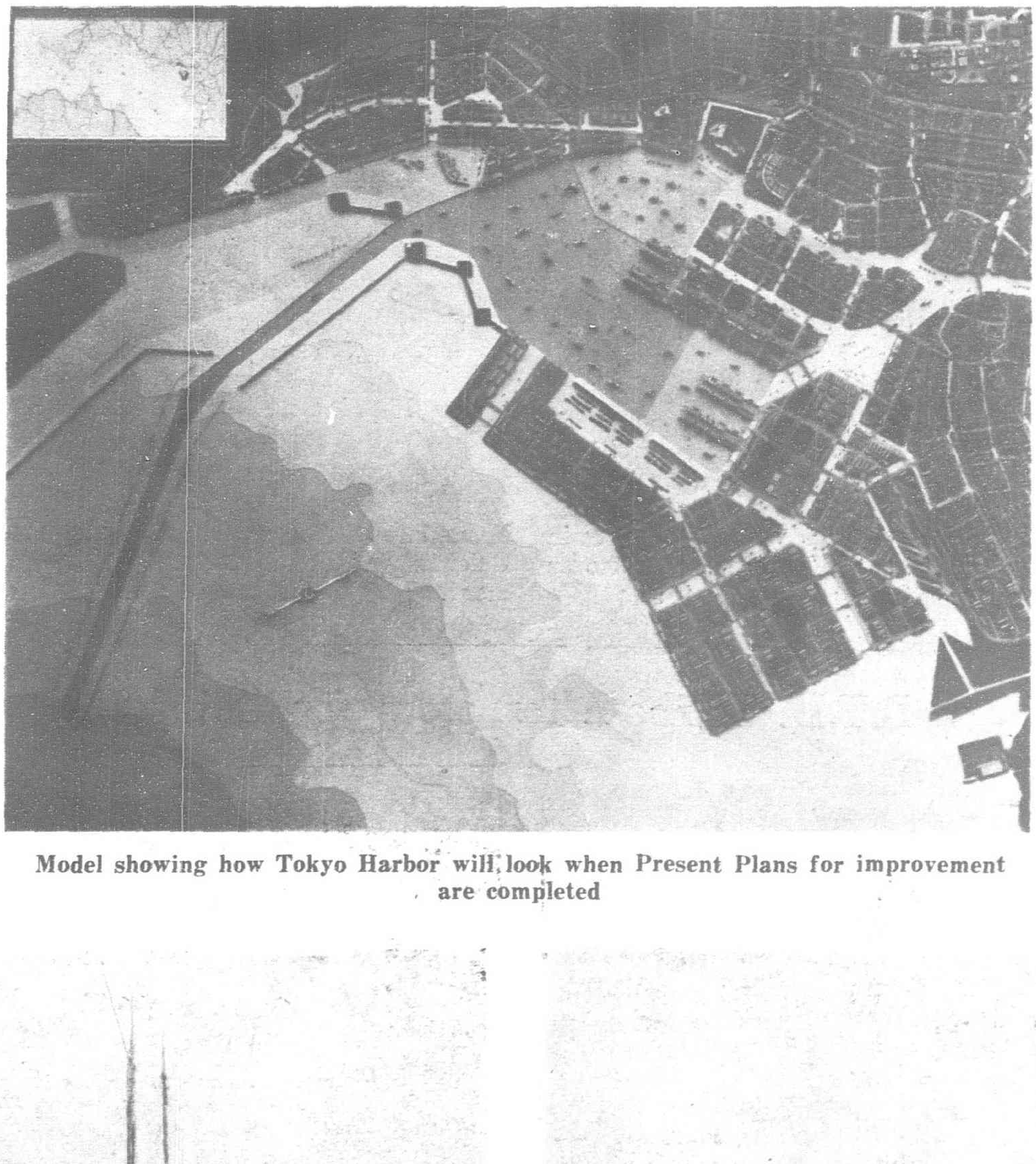
(*A*) Since the Tokyo municipality began seriously to develop the city's functions as a port, a comparatively short time has elapsed.

(*B*) For transhipment to the capital by barge or railway, all foreign cargoes originating in or destined for Tokyo are handled at the wharves in Yokohama, some score miles down the coast. Thus the Yedokko (native of Tokyo) has never seen sizeable ocean-going passenger vessels anchored in Tokyo harbor.

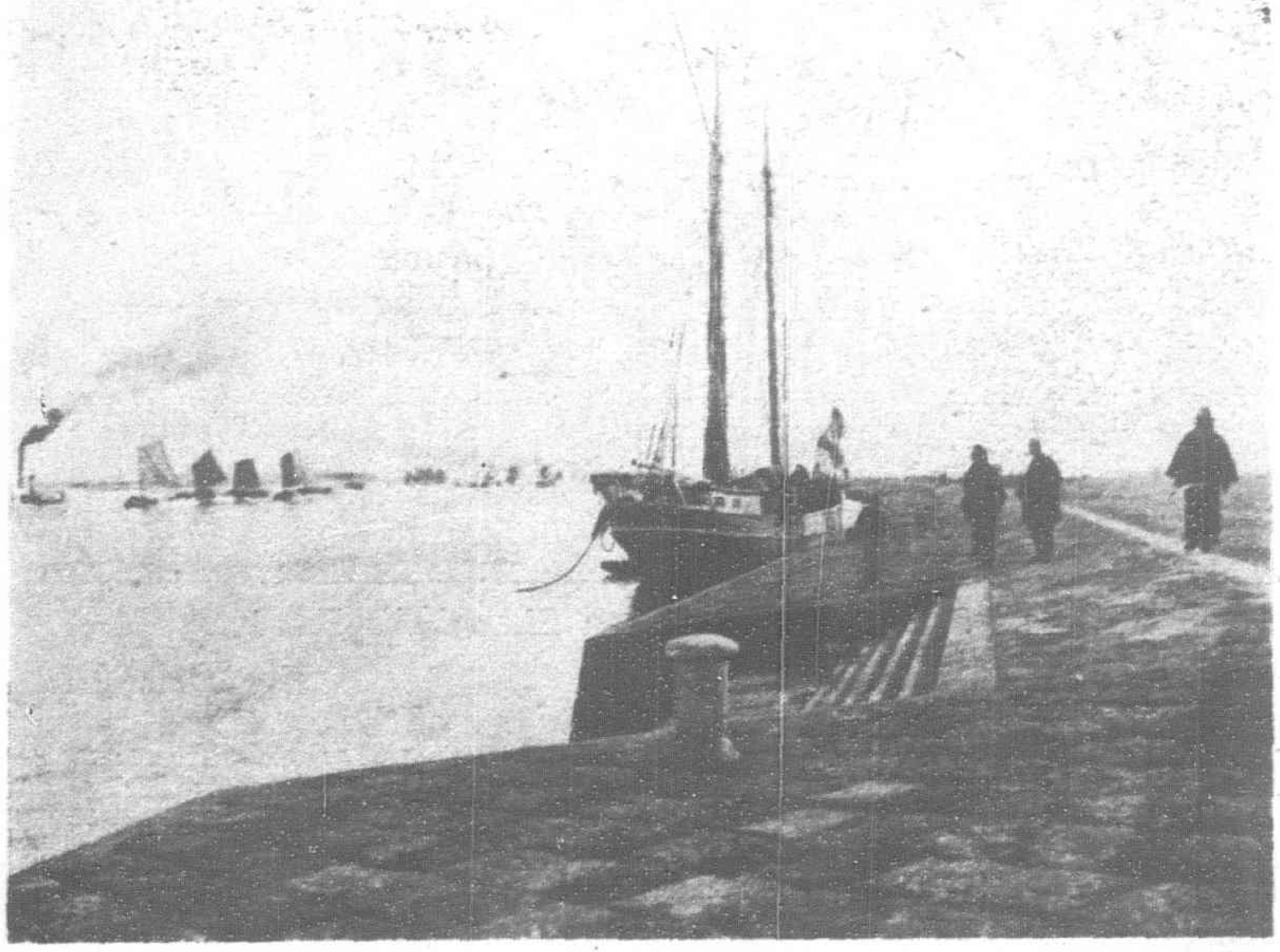
(*C*) The city of Tokyo's ascendency as Capital of the Empire, its economic, political and administrative leadership, only has received full recognition by its people. Therefore, it has been with difficulty that the public at large has attached any real value to the harbor itself.

Notwithstanding these facts, the rapid growth of Tokyo as a port since 1923 is without precedent in the Far Eastern area. Equipment and facilities capable of handling about 3,600,000 tons of freight annually have already been provided for the harbor in order to permit anchorage for ships up to 6,000 gross tons. This has been done at an expenditure of Y.18,000,000 within the past ten years. Yet the capacity of the equipment is now far short of present needs.

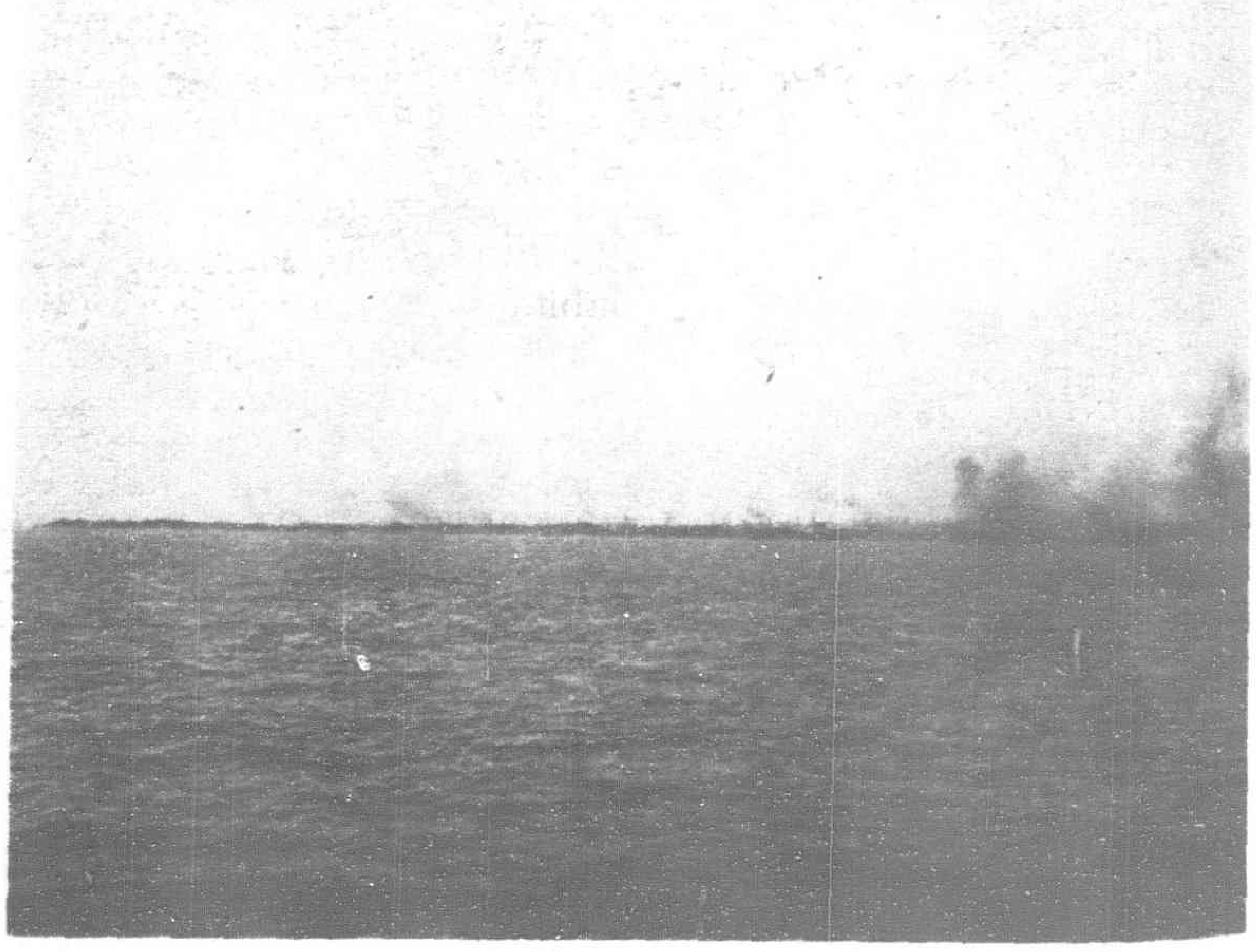
When further harbor development recently became an immediate necessity, the municipal authorities of Tokyo devised a comprehensive plan calling for an outlay of approximately Y.33,000,000 during a period of ten years toward reconstruction and extensive additions to existing port facilities. This plan received the speedy endorsement of the Tokyo City Assembly and was adopted on January 30 last after being discussed in



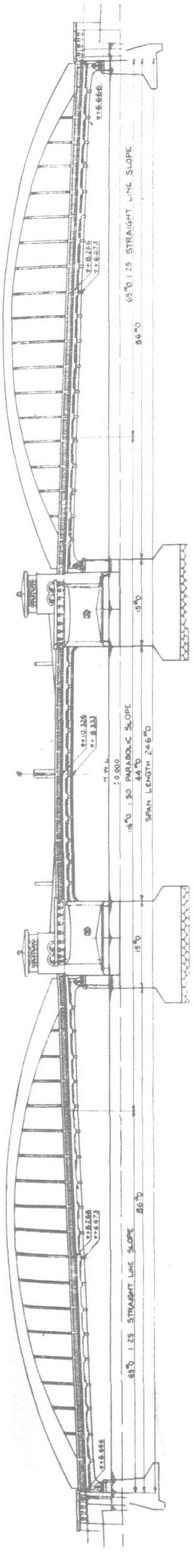
Model showing how Tokyo Harbor will look when Present Plans for improvement are completed



Part of Tokyo Harbor and Landing at Hinode-cho as it appeared in 1915. Note sail boats, which are used no more



Ship-Crowded Tokyo Waterfront September 1, 1923 at time of Great Earthquake, smoke from the accompanying conflagration beginning to rise over the Devastated Capital



Showing details of Bridge to be constructed at the Kachidoki Ferry Crossing of the Sumida River linking Tsukishima Island with the Tsukiji District of Kyobashi Ward. Estimated cost of this structure is Y2,650,000

a special session of the Tokyo Port Inspection Commission called by the governmental Department for Home Affairs. This group of men is said to comprise the most authoritative body for determining the execution of new plans for Japanese ports. At this juncture the necessity of fulfilling the extension project for the port of Tokyo was fully recognized by the State, so the municipality is bending every reasonable effort to carry the plans into effect without longer delay.

1. Inception of the Port of Tokyo

Great earthquakes rocked the capital of Japan just before noon on September 1, 1923, and upon the more than two million people calling the city proper home at that time was suddenly inflicted the most terrifying catastrophe of their lives. The survivors of the devastated areas worked valiantly to rebuild a stricken city from its ashes. They suffered from lack of provisions and the necessary materials needed to reconstruct one-half of a city that had been laid waste before their eyes.

It was due to this natural phenomenon that the development of adequate harbor facilities for Tokyo could be given immediate attention. Heretofore, harbor construction work had lapsed because of urgent efforts exerted to modernize the capital's public utility enterprises. With the first and second Sumida River improvement projects costing about Y.4,500,000, work of port development began in earnest. These endeavors consisted of dredging a boat channel to a point off the old feudal batteries in Tokyo Bay. This channel, 3.6 meters deep and 127 to 218 meters wide, made possible the reclamation of 1,250,000 square meters of land with the earth brought up out of the bay.

Although past work had been on a comparatively small scale, ships of light draft had been able to come into the harbor, yet facing risk, to relieve the distressed inhabitants of Tokyo. Steamers of 2,000 gross tons—then far above the harbor's capacity—unloaded rescue goods for the city in enormous quantities. Many of them even grounded upon the harbor floor during ebb-tide.

Construction work for the port of Tokyo gradually came to be recognized by the people as an indispensable undertaking for the restoration of the metropolis.

Under these circumstances, the third Sumida River improvement project was put into operation with an outlay of Y.18,000,000. Upon its completion the harbor was to be capable of disposing of about 3,600,000 tons of cargo yearly. This work has been practically completed.

OUTLINE OF PAST DEVELOPMENT

Projects	*Time*	*Cost*	*Nature of Work*
		Yen	
First Sumida River Mouth Improvement Work	1906-1911	2,512,406	Dredging: Eitaibashi (bridge) to Harbor Mouth—Distance, 9,550 ms.; width, 91 to 127 ms.; depth, 3.6 ms. Reclamation: 474,441 sq. ms. Hinode-cho wharf: Length, 667 ms.; depth, 3.6 ms.
Second Sumida River Mouth Improvement Work	1911-1916	1,923,289	Dredging: Eitaibashi to Harbor Mouth—Distance, 9,160 ms.; width, 127 to 218 ms.; depth, 3.6 ms. Reclamation: 782,657 sq. ms. Groin: Length, 3,680 ms.
Facilities for Water and Land Connection	1924-1925	1,573,530	Hinode-cho Pier: Length, 564 ms.; depth, 6.1 ms. Hinode-cho Shed: 8 roofs; area, 17,587 square meters. Water Service for Ships: 7 water plugs; 2 tugs.
Third Sumida River Mouth Improvement Work	1922-1932	17,944,563	Dredging: Channel and Anchorage—Area, 3,736,000 sq. ms.; depth, 2.5 to 7.6 ms. Reclamation: Area, 3,512,130 sq. ms. Shibaura-cho Quay Wall: Length, 909 ms.; depth, 7.6 ms. Temporary Breakwater: Third Old Fort to No. 6 Reclaimed Land—Length, 2,386 ms. Groin: Length, 877 ms. Mooring Buoys: 7 Lighting Buoys: 2 Mark Buoys: 13 Landing: Length, 282 ms.
Harbor Railroad Construction	1928-1930	272,074	Harbor Railroad: Length, 2,700 meters. Movable Bridge: 1

2. Present Condition of the Port of Tokyo

In Tokyo harbor goods are handled in the following two ways:

(*a*) Direct shipment of incoming or outgoing cargoes by steamer to or from Tokyo harbor.

(*b*) Unloading from steamer to barge at the port of Yokohama and then transhipment by means of tugs up the bay to Tokyo.

Due to the lack of adequate facilities at Tokyo prior to the 1923 earthquake, merchandise had been brought into the city by extremely disadvantageous methods for traffic economy, but after reconstruction had begun and once the facilities of Tokyo harbor were improved, freight delivered by direct method has become common practice.

To-day the water depth of Tokyo's harbor basin is deeper than ever before, the surface area greater, piers have been built, mooring buoys placed, and larger steamers laden with heavier cargoes enter the bay port in ever increasing numbers. Many more are awaiting the opportunity to anchor in Tokyo harbor as development progresses and facilities permit.

These facts may be proved by the following figures:

A COMPARATIVE FIVE-YEAR ANALYSIS SHOWING THE TOTAL TONNAGE OF SHIPS ENTERING TOKYO HARBOR, NUMBER OF SHIPS, MEAN GROSS TONNAGE PER SHIP, AND VOLUME OF GOODS IN TONS, INCLUSIVE OF IMPORTS AND EXPORTS

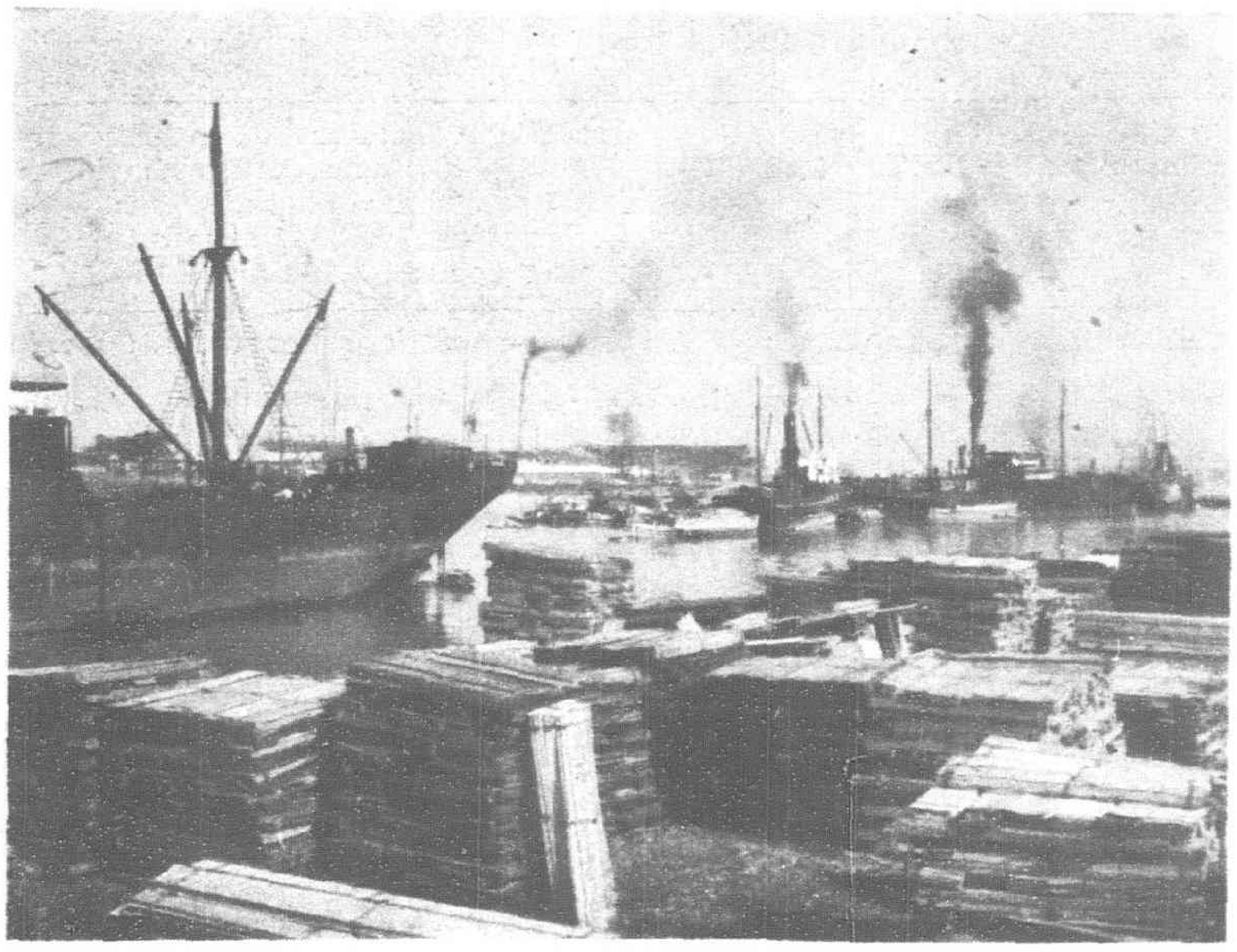
Year	*1928*	*1929*	*1930*	*1931*	*1932*
Gross tonnage of ships	3,399,091	3,501,399	3,823,450	4,881,684	5,858,121
No. of ships	1,869	1,935	1,972	2,387	2,715
Mean gross tonnage per ship	1,819	1,810	1,932	2,045	2,157.7
Goods inclusive of imports and exports in tons	2,787,604	2,967,792	2,892,403	3,819,440	4,392,019

The port of Tokyo being backed by the city of Tokyo, which consumes mountains of goods annually, the total volume of imports and exports is unbalanced to such a degree that exports from the city are only 9 per cent of imports to the city.

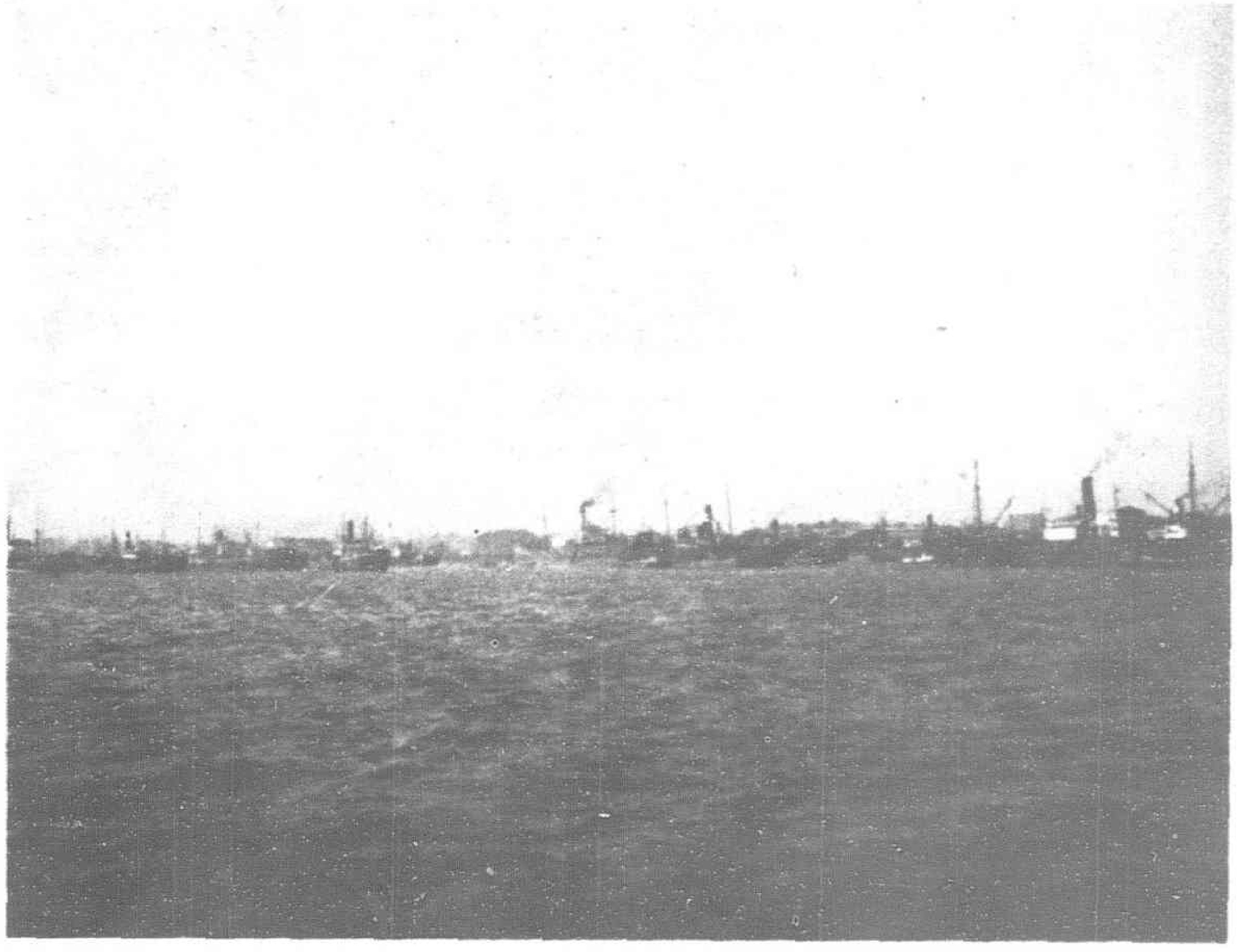
Some of Tokyo's principal imported products, raw as well as manufactured, entering Tokyo every year, show the following distribution in percentages of the total import volume:

Coal, 25 per cent; timber, 15 per cent; iron and steel, 12 per cent; rice and other grain, 12 per cent; cement, 6 per cent; sugar, 6 per cent, and paper, 3 per cent.

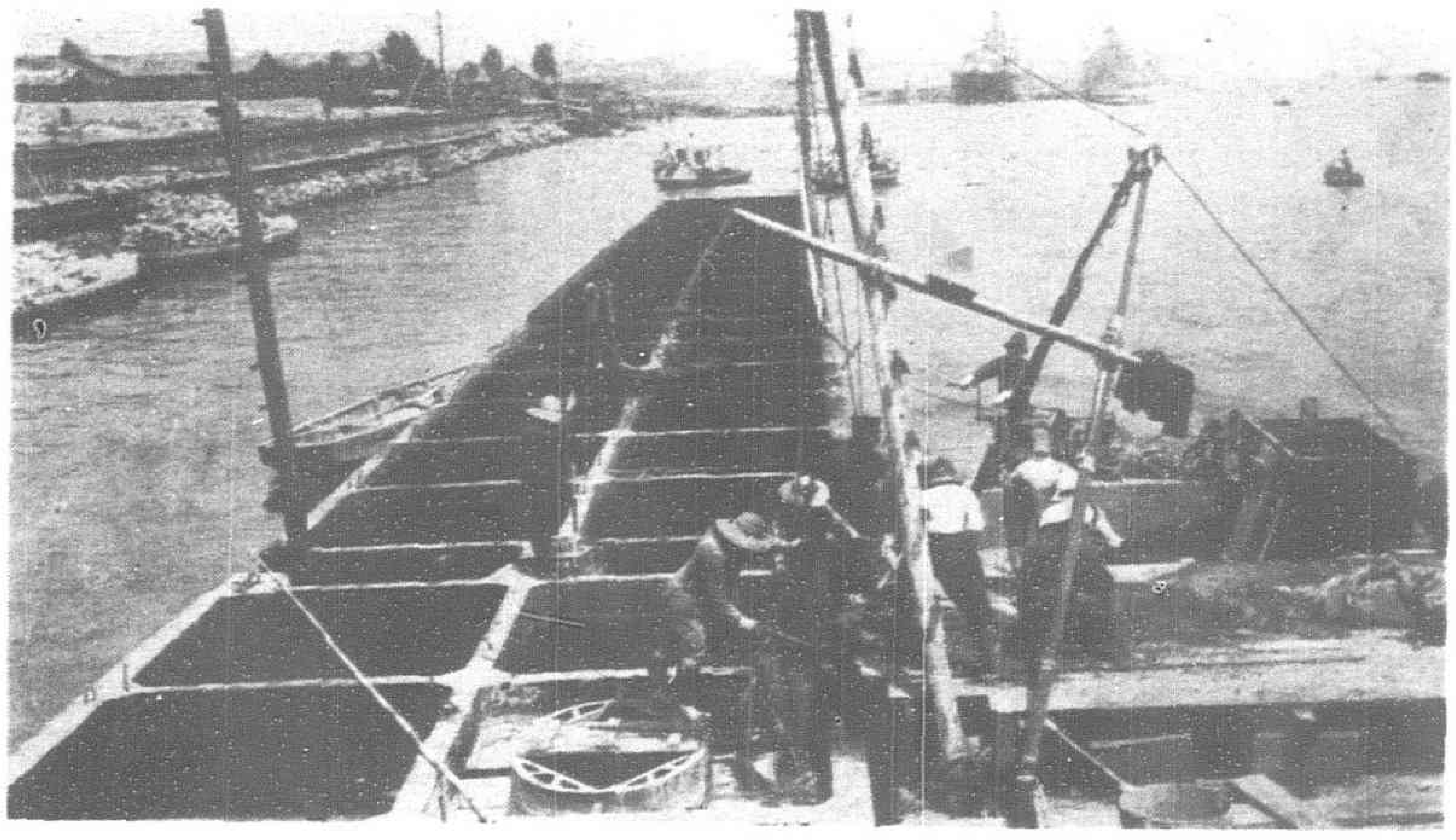
Briefly indicating some of the harbor facilities of Tokyo, we find that a breakwater is situated between No. 6 reclaimed land and the third obsolete fort, extending for a distance of 2,386 meters and protecting the harbor from the open water of Tokyo Bay. A groin, which lies on both sides of the ship channel, are each 4,380 meters long and serve to protect the channel from drifting sand. The anchorage is 7.6 meters (25 feet) to 4.5 meters (15 feet) deep, covering an area of 1,450,000 square meters within which 12 mooring buoys are provided.



Reconstruction materials being unloaded in the Winter of 1923 at Akashi-cho Landing at the mouth of the Sumida

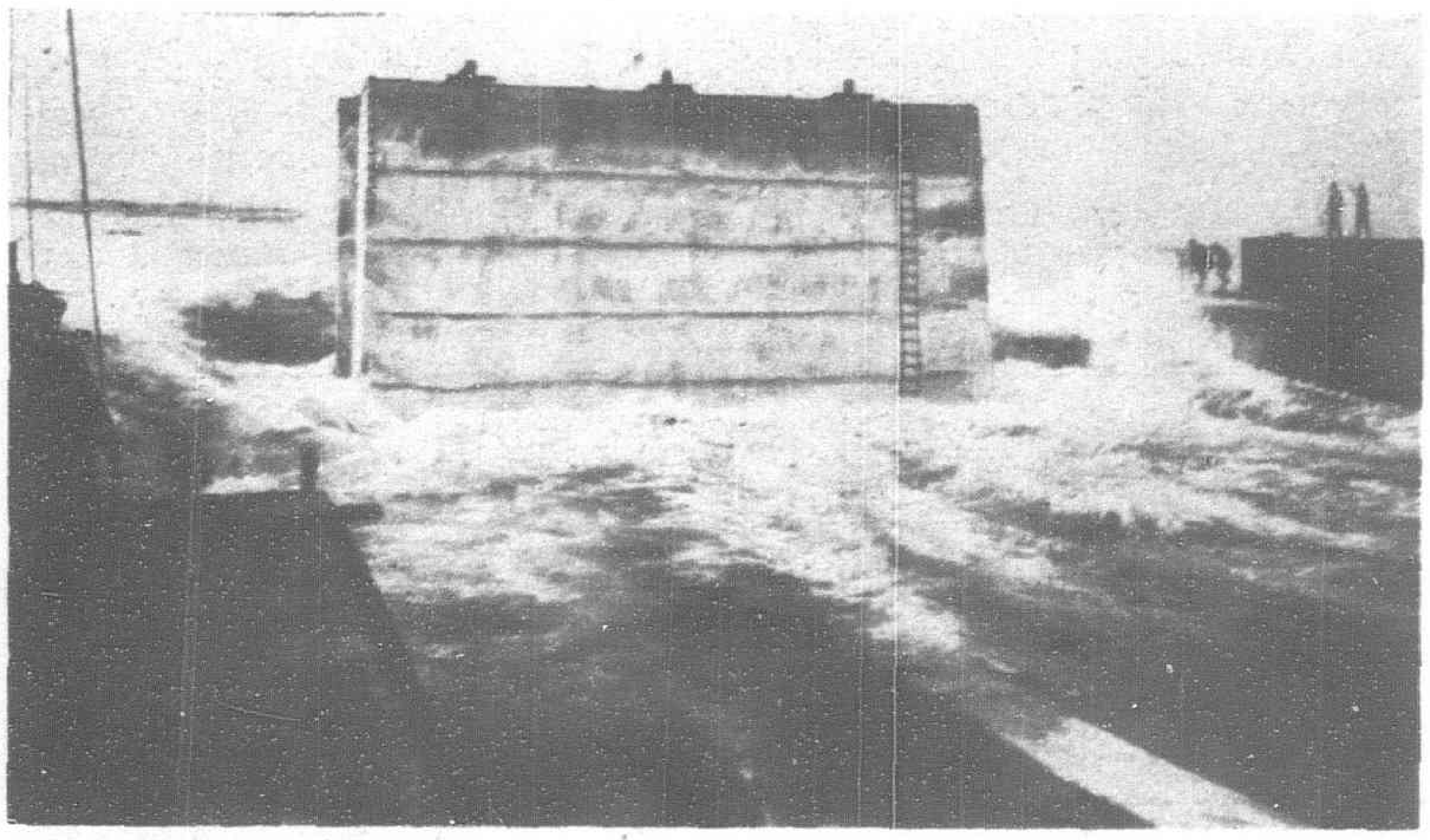


Tokyo's Waterfront from the Harbor as it looked soon after the 1923 Earthquake

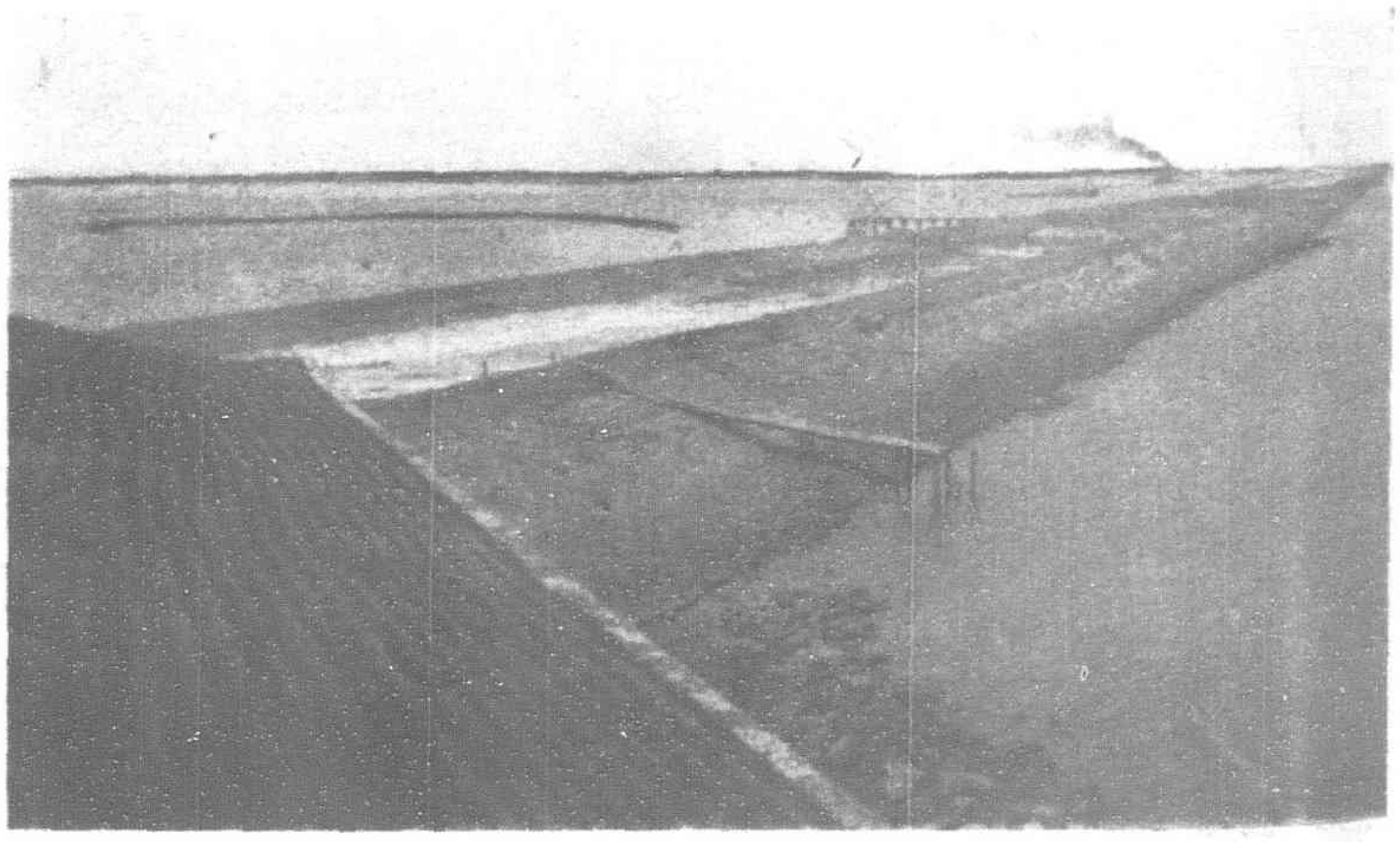


Concrete pouring underway at Shibaura Quay Wall Caisson in 1928, Shiba Ward, Tokyo

Looking upstream from the mouth of the Sumida River in 1928, with Eitaibashi (bridge) in the distance

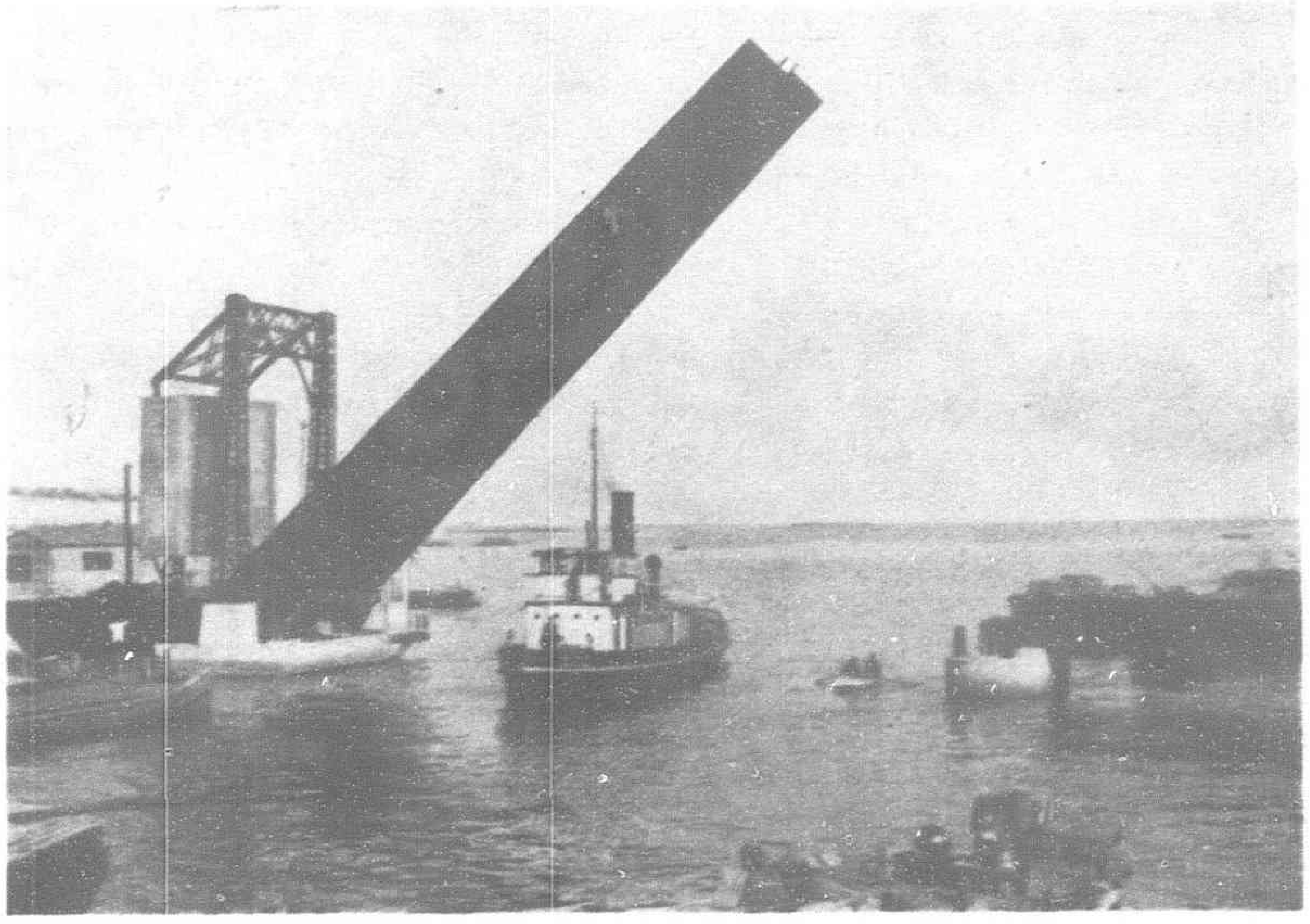


Launching a Concrete Caisson on Tokyo's Waterfront in 1928, Measurements: 59.06 feet (18ms.) long, 26.25 feet (8ms.) wide, 30,512 feet (9.3 ms.) high, and about 670 tons in weight



Harbor Breakwater under construction in 1928 by filling in from the Tokyo Bay Floor with dredged rock, gravel and soil

View of Pier and Landing along Hinode-cho Waterfront in 1930, Shiba Ward, Tokyo



Single Leaf, Swing Type Bascule Bridge at Hinode-cho Waterfront, Shiba Ward, Tokyo

As facilities to link land and water, there are the Hinode-cho pier, 564 meters in length, and the Shibaura-cho quay, 909 meters long, both along the Shiba Ward waterfront. The former has been in use since 1916 and the latter was completed in 1932.

There are transit sheds, serving to store goods temporarily, and railroad yards adjacent to the Hinode-cho pier. Similar equipment for the Shibaura-cho pier is to be realized in the execution of the new project now underway.

An insufficiency in existing facilities is obvious, when we note that goods handled at the Hinode-cho pier amounts annually to about 2,000 tons to one linear meter of wharf, whereas the gross tonnage of steamers moored to buoys reaches 280,000 tons annually per one buoy.

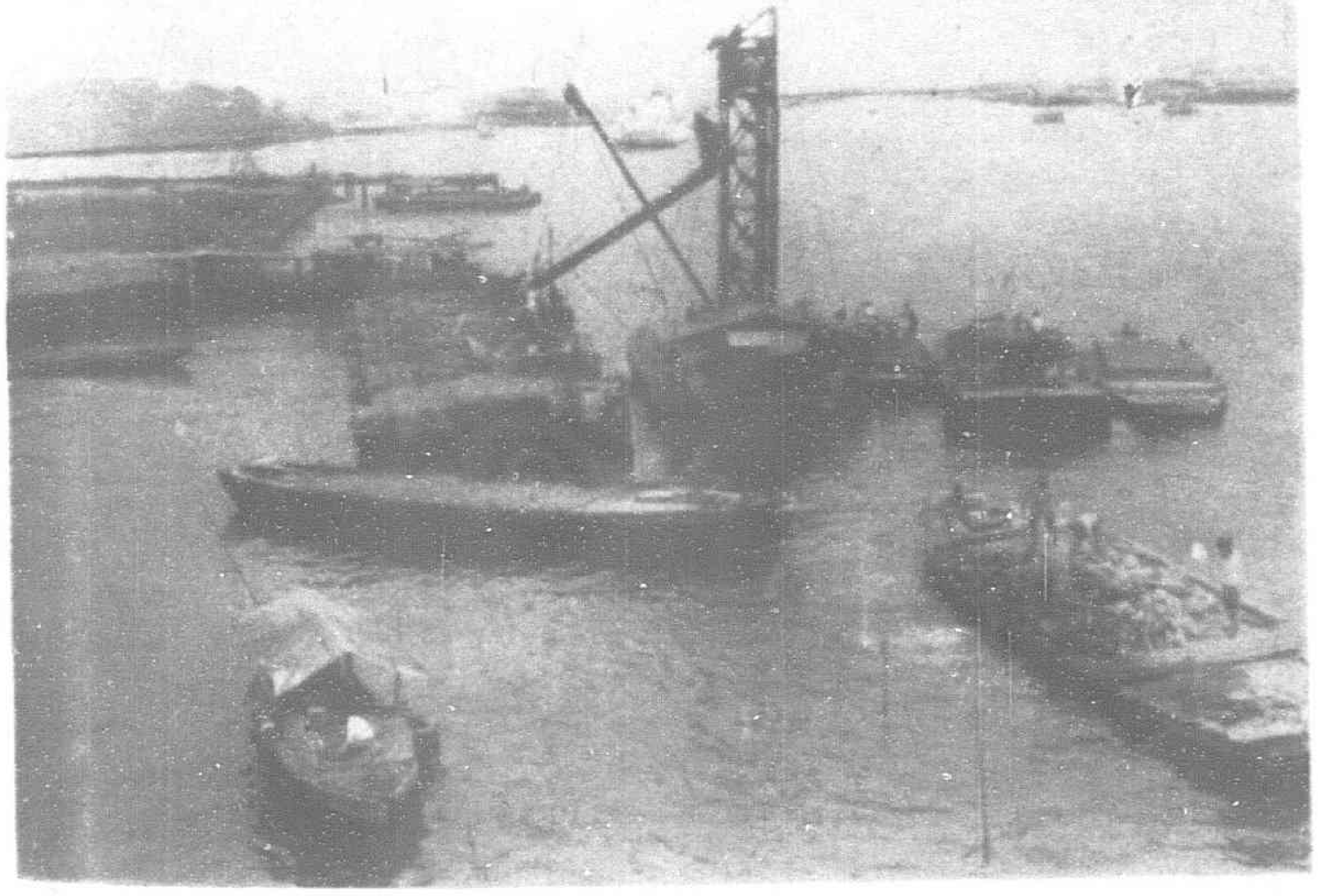
3. Outline of New Harbor Construction Work in Tokyo

Although roughly one-half of Tokyo was in ruins a decade ago, through the determined spirit of its citizens, she has now arisen in a new form and progressed to a point that admits her again as one of the world's chief cities. Her population on October 1, 1932 had topped 5,311,926, according to municipal census figures.

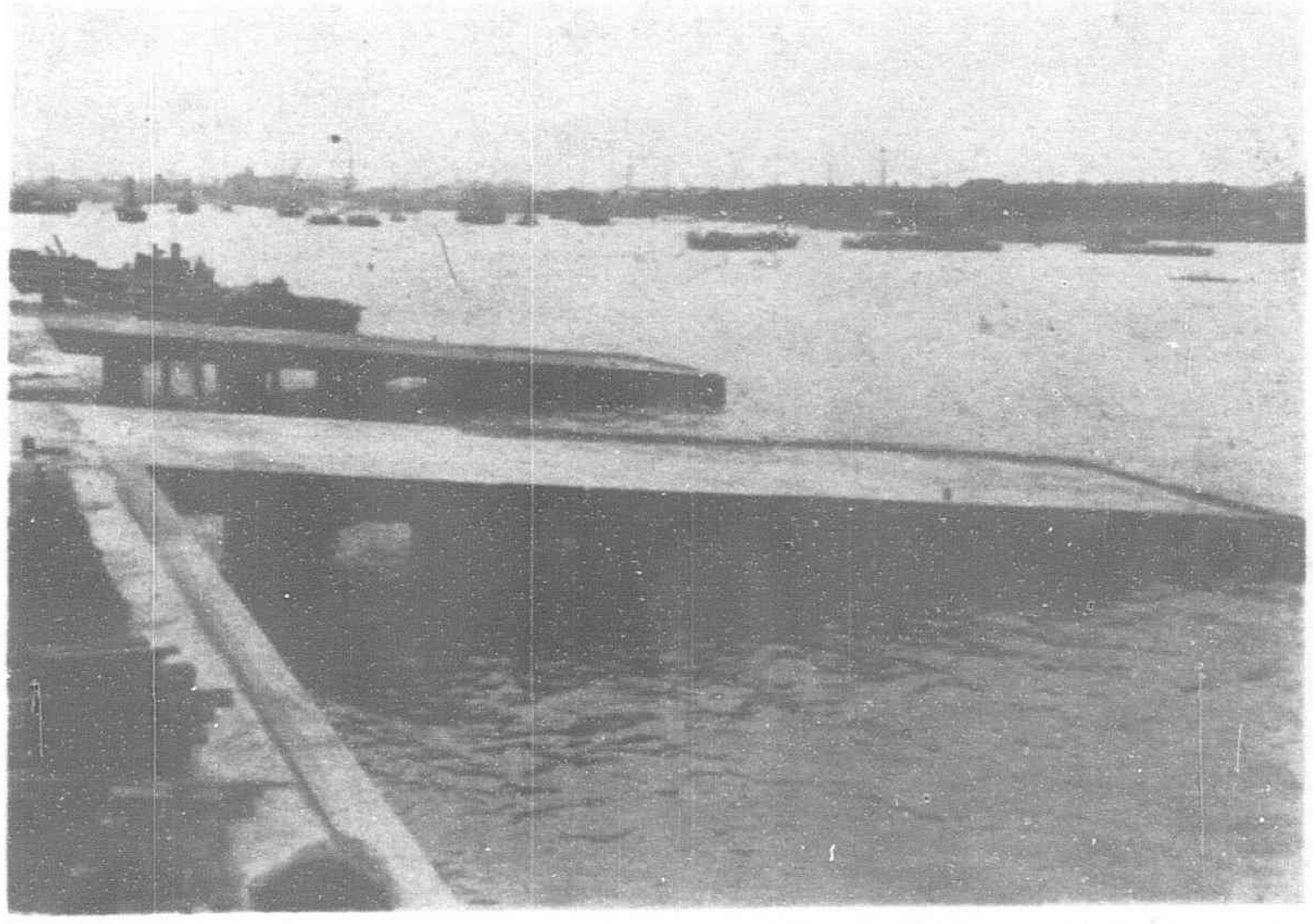
It is estimated to-day that the total volume of goods handled in Tokyo harbor has reached a new peak with the continued improvement in available facilities for dealing with it. With no appreciable diminution that might be laid to world economic depression, the gross weight of the volume of goods is constantly growing by reason of the inflow of additional freight to the city. Owing to the capital's steady rise in population since 1924, the year following the destructive earthquake there has been a consequent lessening of the burden on railway traffic as the volume of goods handled at Tokyo harbor increases. The quantitative increase of goods handled in Tokyo harbor during the decade from January, 1922 to December, 1931 is shown in tons as follows:

	Exports			*Imports*			
Classification Year	*Loaded at Yokohama Transported by barge*	*Loaded at the Port of Tokyo*	*Total*	*Unloaded at Yokohama Transported by barge*	*Loaded at the Port of Tokyo*	*Total*	*Both Exports and Imports Total*
1922 ..	289,310	250,069	539,379	3,798,505	575,814	4,374,319	4,913,698
1923 ..	106,647	160,929	267,576	3,104,292	1,576,212	4,680,504	4,948,080
1924 ..	130,852	323,396	454.248	3,533,601	2,120,276	5,653,877	6,108,125
1925 ..	71,076	374,479	445,555	3,284,538	1,882,602	5,167,140	5.612,695
1926 ..	268,968	353,148	622,116	3,740,820	1,981,636	5,722,456	6,344,572
1927 ..	305,014	382,655	687,669	3,711,229	2,078,801	5,790,030	6,477,699
1928 ..	354,012	410,039	764,051	3,861,398	2,702,822	6,564,220	7,328,271
1929 ..	427,128	421.204	848.332	3,947,641	2,868,726	6,816,367	7,664,699
1930 ..	314,308	458,201	772,509	2,861.124	2,800,851	5,661,975	6,434,484
1931 ..	250,476	482,813	733,289	2,561,354	3,686,627	6,247,981	6,981,270

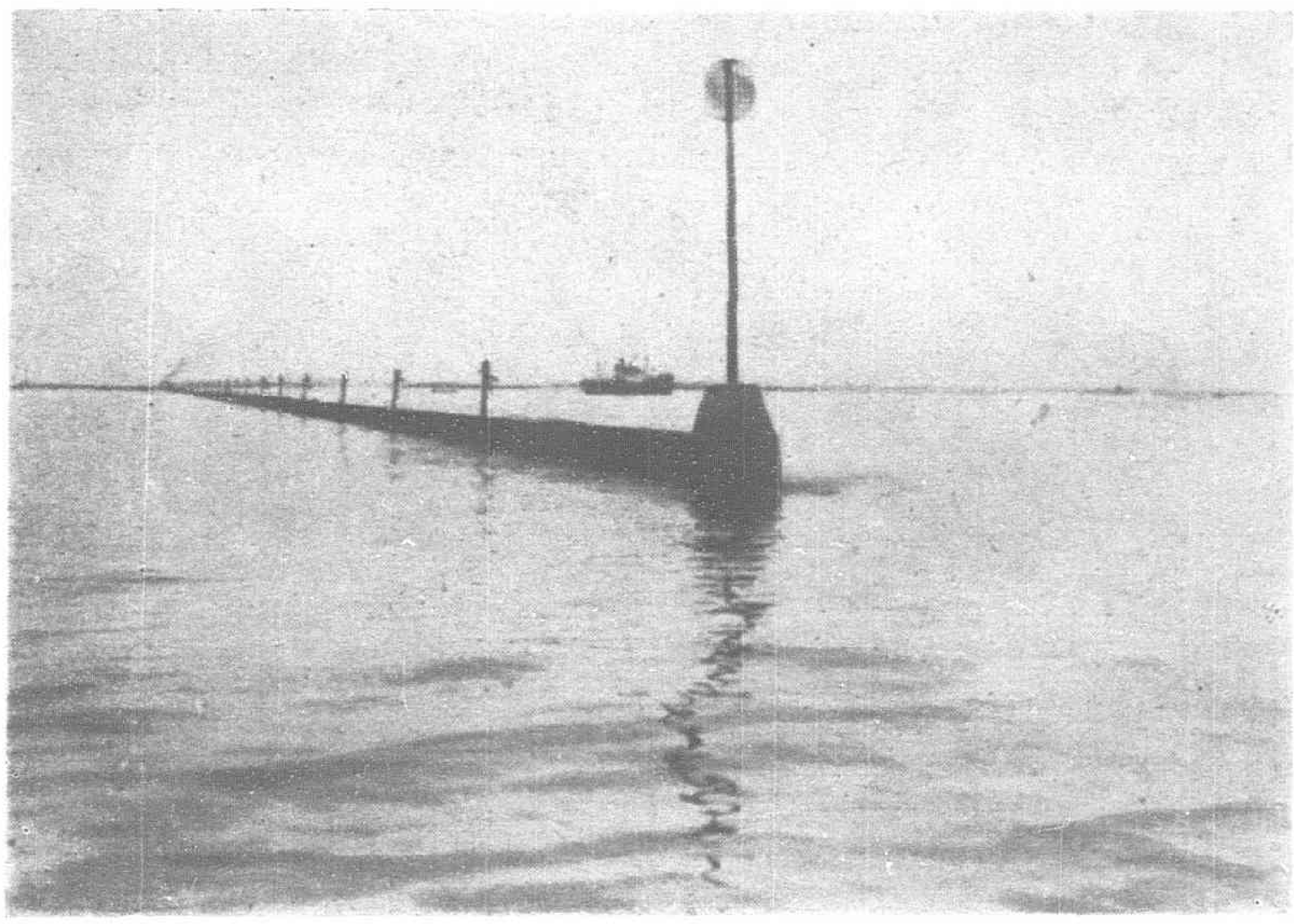
If the volume of goods destined to pass through Tokyo harbor in the year 1940, inclusive of exports and imports, is estimated, the gross weight will amount to approximately 12,500,000 tons; and domestic freight alone may be expected to reach about 7,500,000 tons of this figure, or roughly 60 per cent of the total. The remaining 5,000,000 tons, which represents foreign freight, will be transhipped up the bay in barges from Yokohama, judging from to-day's volume.



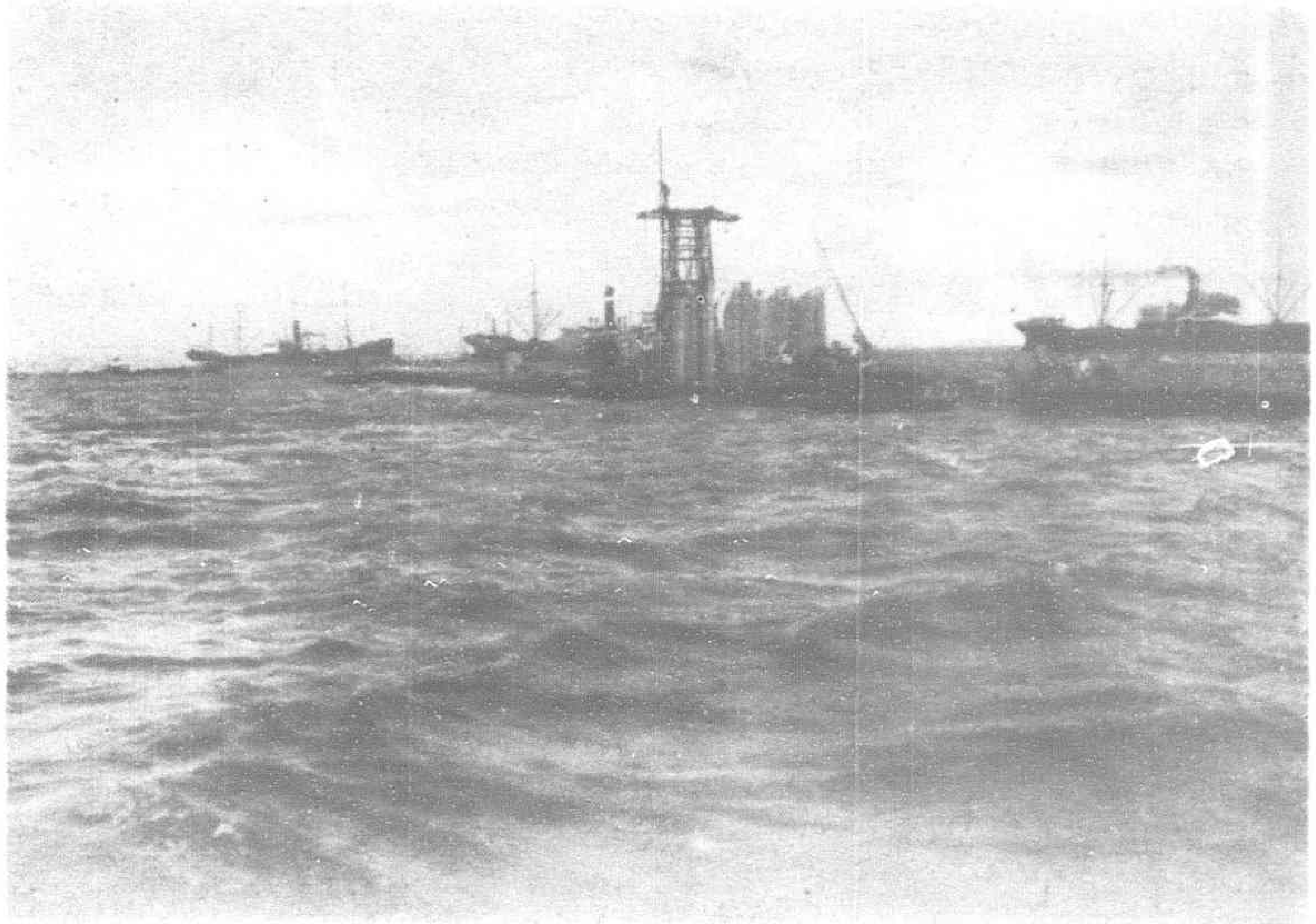
Concrete being poured into the Sambashi Pier Structure Cylinder at Takeshiba-cho, Shiba Ward, September, 1932



Small Boat Landing in front of the Tsukiji Central Fish and Food Market, Kyobashi Ward, Tokyo



Concrete-Pile Groin marking off Ship Channel in Tokyo Harbor



Construction of the Shibaura Mole underway in August of 1932

Considering the matter from the point of population, the estimated total increase in Tokyo's population by the year 1940 is expected to reach at least 6,600,000. Therefore, sea-borne goods per capita annually, judging from this figure, will approximate 1.89 ton, or nearly two tons per person. In 1929 the per capita consumption figure for Tokyo was 1.6 ton. The estimated future per capita consumption is not over-rated because the volume of goods handled will rise rapidly by that time on account of the utilization of reclaimed land in the harbor, the development of more hinterland and the transfer of domestic goods now carried overland to ships that will dock at Tokyo harbor. This latter condition is with the consideration that progressive development on both land and water will facilitate movement of goods by means of more adequate equipment.

The above per capita figure being correct, surplus freight to the amount of 4,000,000 tons must rely upon handling at Yokohama for want of adequate facilities in Tokyo.

Domestic freight for Tokyo should by rights be unloaded in Tokyo by direct transfer from ship to lighters or dock because the port of Yokohama is on the seacoast about 20 miles distant from the city. Tugging a chain of 15 barges wastes time and money as well as the goods being exposed to damage when transhipped through the storm danger zone. In this relay, freight is transhipped to Tokyo and part of it taken up the Sumida River. An immense loss in time and money could be saved the people of Tokyo by shipping directly to Tokyo harbor.

When the new project is actually consummated, the port of Tokyo should not only add to its general prosperity, but the financial activities of the city are due to take on renewed life.

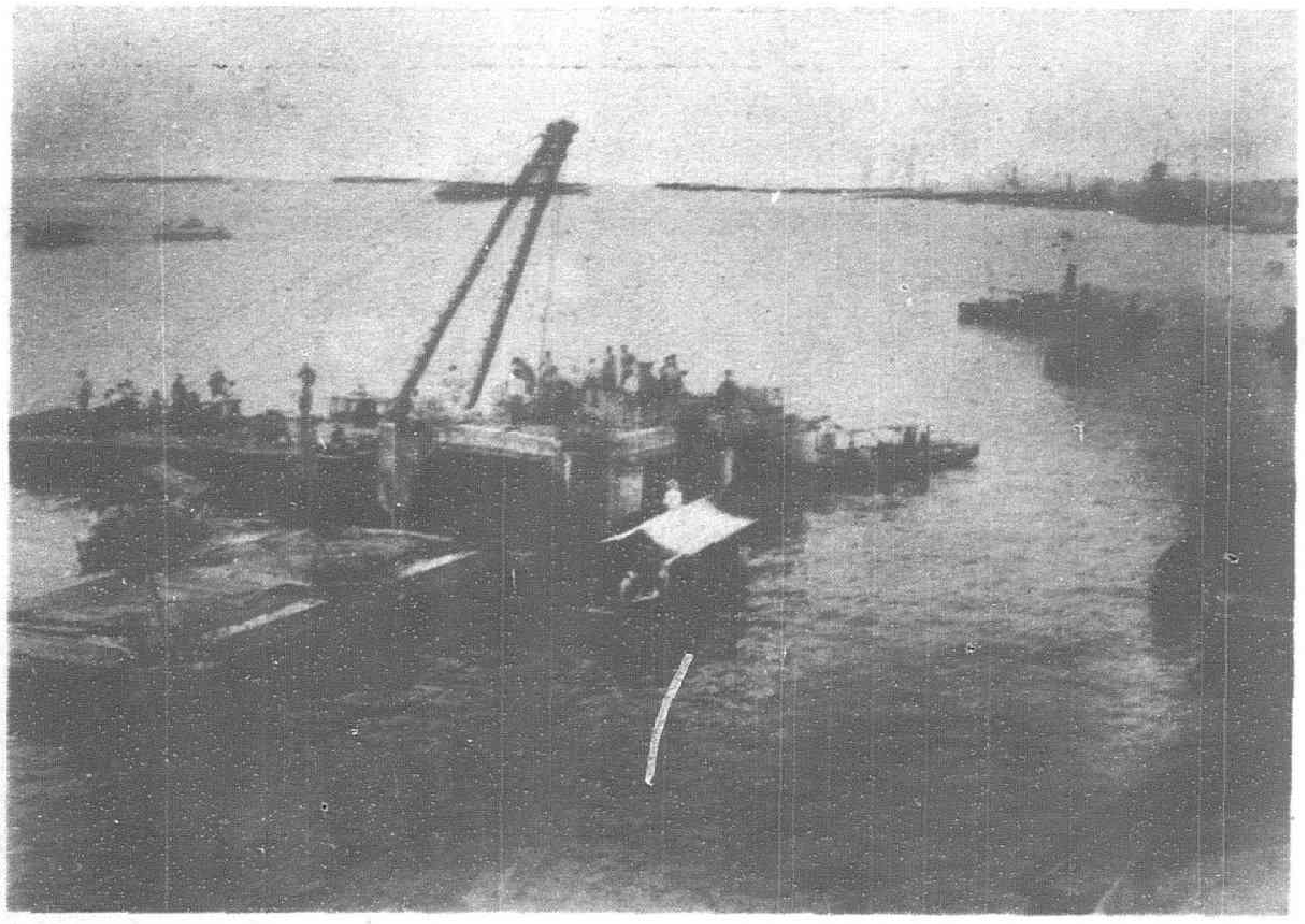
Necessary construction and operating expenses can be had by selling sections of reclaimed land belonging to the city. This land should bring good prices, particularly for industrial uses. Additional revenue may be derived from charges on new harbor facilities.

Below is a list of the principal items, and their estimated total respective costs, required to engineer current plans designed to take care of the future port growth of Tokyo.

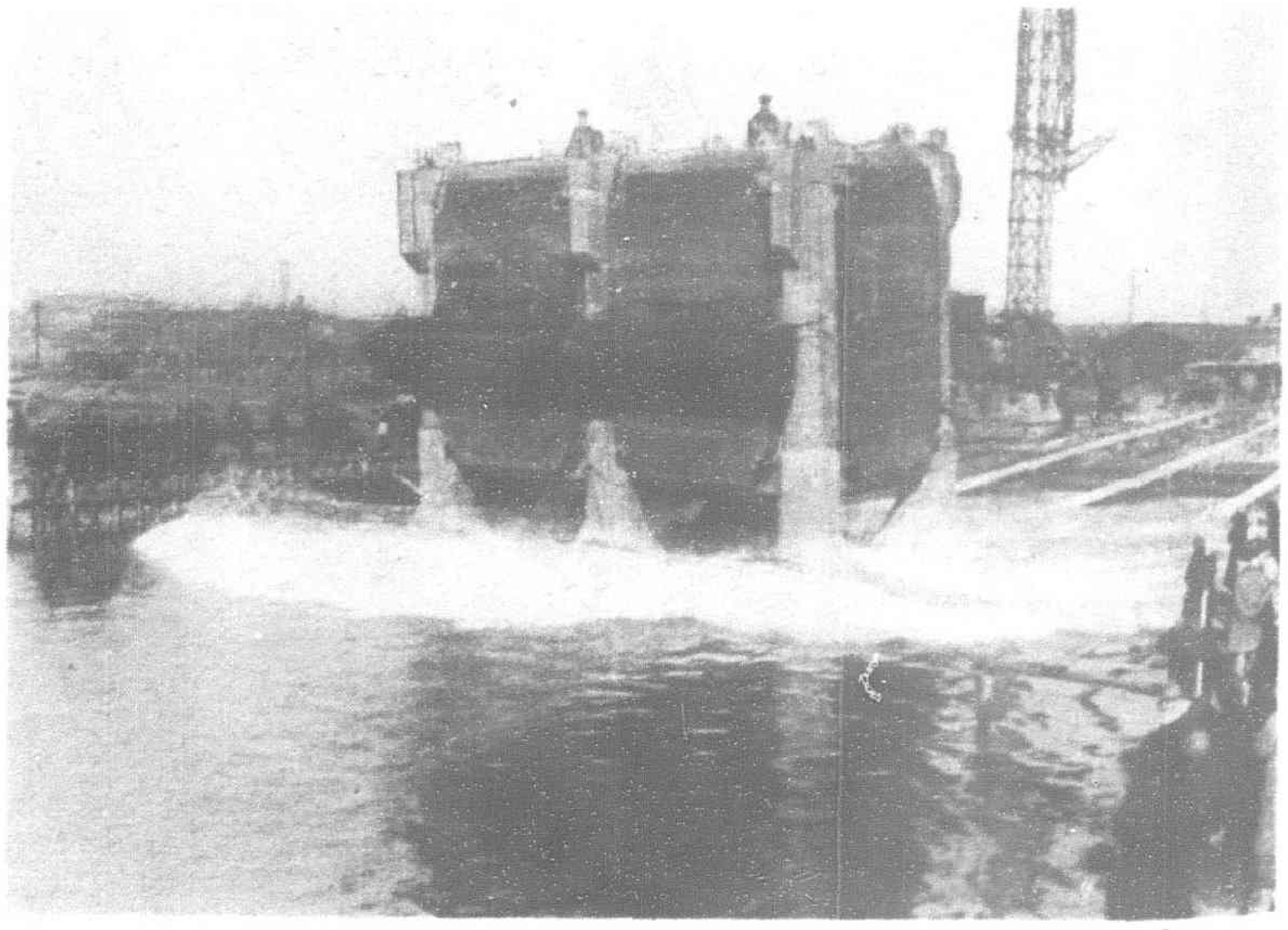
Item	*Cost*
Dredging and reclamation	Y.8,100,000
Breakwater and groin	2,972,720
Quay and pier	8,110,750
Other facilities	425,000
Roads and railways	7,194,500
Temporary storage sheds	2,362,500
Mechanical equipment and dredges	1,390,000
Other items	276,530
Compensation to fishermen	350,000
Office upkeep and general business	1,818,000
	Y.33,000,000

An epitomized sketch of Tokyo's 10-year harbor development project set for completion in 1940 is as follows:

(*a*) THE SHIP CHANNEL—Always to maintain a depth of 7.6 meters below low water level, the ship channel must be kept dredged—this from the harbor mouth, including the second and fourth obsolete batteries, to the southward until normal depth is 7.6 meters extending along a slightly bent line. Accommodation in the harbor will then be available without hindrance to the double



Sinking a Block Pier Section into place at Takeshiba-cho, Shiba Ward, Tokyo, August, 1932



Scene at the launching of a New Pier Section for Tokyo Harbor on January 30, 1933, just as the Giant Block takes to the water from a Shibaura Slipway passage of 6,000 gross ton vessels. The width of the entire channel is to be increased to 200 meters, where it is not already that wide, as decided upon by the investigation committee.

(*b*) THE BREAKWATER—The Daiba, or obsolete fort batteries, consisting of a group of separate islands, which were hurriedly constructed during the last days of the Tokugawa shogunate as fortifications to protect Yedo (former Tokyo) from foreign invasions, will serve admirably in linking up the breakwater structure. According to plans, the breakwater will jut out 570 meters to the south-westward in a swinging line from the third Daiba.

(*c*) THE MOLE—A mole of reinforced concrete sheet piles will be constructed to shield the barge basin apportioned to the south-east side of the harbor off from No. 8 reclaimed land.

(*d*) THE QUAY WALL—Decision regarding the quay wall was reserved until a future date, in keeping with the report of the harbor investigation committee, which reads : " Decision concerning both the jetty and the quay wall at No. 4 and the jetty at No. 5 reclaimed land shall be deferred until a further and more complete investigation has been made regarding their construction."

(*e*) THE PIER—A reinforced concrete pier, measuring 309 meters in length, 6.7 meters in depth and about 10 meters in width, is now under construction at Takeshiba-cho, near the mouth of the Sumida River. The box-like sections of this pier structure—about five meters wide and 11 in length—have iron lids clamped to its four sides and bottom to enable them to be floated to their proper position preparatory to sinking and filling with concrete.

(*f*) THE LANDING—The first type landing, 2.72 meters in depth, will be constructed at the south-east front of No. 8 reclaimed for a distance of 445 meters, and another alongside No. 5 reclaimed land 622 meters long.

The second type landing, 2.12 meters deep, will be built along the side of No. 10 reclaimed land, which lies on the south-west side of the raft basin. For some time in the future these will be the only landing facilities in the Fukagawa Ward district because of suspended action on the two jetties and a quay wall at Nos. 4 and 5 reclaimed land.

(*g*) SHORE PROTECTION WORK FOR RECLAIMED LAND—The shoreline of the new reclaimed land is protected by reinforced concrete sheet piles.

(*h*) ANCHORAGE—Dredging in the harbor is to be effected that anchorage may be available for 46 ships of 2,000 to 6,000 gross tons each at one time.

(*i*) BARGE BASIN—On the south-west side of No. 8 reclaimed land about 145,000 square meters of water area has been allocated to a barge basin. Some barges will lie in wait here while incoming ships are at anchor, while others will serve to help unload freight transhipped from Yokohama.

(*j*) TIMBER-RAFT BASIN—A raft basin will be provided at the north-west side of No. 10 reclaimed land for the temporary collection and distribution of lumber unloaded from ships anchored in the harbor.

(*k*) CANALS DIVIDING SECTIONS OF RECLAIMED LAND—Sections of reclaimed land are so large that they are cut into two or three smaller divisions by canals to enable the passage of barges.

(*l*) DREDGING IN RELATION TO LAND RECLAMATION—In the present project, the total area to be dredged covers approximately 5,850,000 square meters and the quantity of bay-bottom to be removed is estimated at about 16,830,000 square meters. With this mass of earth, new reclamation work along the waterfront will reach about 3,080,000 square meters more. If an area of one square meter brings Y.30 by sale, a total income of about Y.92,400,000 is derivable from the above land.

Type of Dredger Used	*Number*	*Total Capacity Per hour (for all of each type)*
Bucket	3	25,920 cubic feet
Priestman grab bucket ..	2	2,160 ,, ,,
Dipper	1	6,480 ,, ,,
Pump (with cutter)	1	6,480 ,, ,,
Pump (without cutter) ..	2	18,360 ,, ,,

(*m*) SHEDS AND WAREHOUSES—Plans for sheds, warehouses, godowns, etc., for the Tokyo harbor development project underway have fallen to the same lot with the jetties, except structures to be built on the Shibaura-cho quay. Such work has been postponed until future needs demand their construction.

(*n*) ROADS AND BRIDGES ON RECLAIMED LANDS—Islands only comprise the reclaimed land formed during execution of the third Sumida River improvement project, now practically completed, as well as in the present harbor development undertaking. Consequently it will be necessary to build gravel roads and bridges (19 wooden and one steel) to connect the various sections with each other in order to pave the way for traffic to and from these city areas.

(*o*) BALANCED LEVER LIFTING BRIDGE FOR HARBOR—At the Kachidoki ferry crossing on the Sumida a movable bridge with three spans is being constructed to link the island known as Tsukishima with the Tsukiji district of Kyobashi Ward, and it is estimated that its cost will be about Y.2,650,000. Both end spans are of the tied arch type, while a central span 44 meters (150 feet) long is a double-leaf bascule. The structure will have a total span of 810 feet and a width of 72 feet. Upon completion the bridge will add considerably to the importance of the new Tsukiji Central Fish and Food Market, now building, as well as make the harbor view more impressive. Besides, not to say the least, it will constitute the main thoroughfare in connecting downtown Tokyo with the new reclaimed lands.

(*p*) RAILROADS—Harbor railroads and numerous spurs will be laid to connect with the network of tracks linking the various railway lines conveying in the city. Elevatable railway bridges have been adopted as standard equipment, with the object in view of not disturbing access to the barge channels.

(*q*) OTHER FACILITIES—Additional light buoys and mark buoys are to be placed along the ship channel. Branch rivers and canals in the city and the Sumida River south of Eitaibashi (bridge) must undergo improvement as soon as possible, according to the report of the investigation board.

In endeavoring to improve Tokyo's harbor facilities, often there have been many obstacles to overcome. Three of them may be suggested as follows :

It is of comparative recent date that the port of Tokyo has become active. Consequently the people as a whole understood but little about its advantages and the authorities have been hard put to it in getting across the idea of having vessels of large tonnage drop anchor at their front doorstep.

As anchorage at Tokyo becomes increasingly popular, the demand on port facilities at Yokohama has lessened. For this reason reports confirm that periodically Yokohama officialdom attempt to interfere with the plans of Tokyo for a greater harbor.

Many a fisherman, who earns his livelihood over the shoals off the mouth of the Sumida and considers these fishing fields to be his special preserve, has come to grief as work progresses steadily upon the plans for a bigger and better harbor for Tokyo. Thus compensation has had to be forthcoming.

The above mentioned three obstacles can be surmounted, e.g., by direct appeals to the better understanding of the people of Tokyo for the good of their city and themselves, by letting Yokohama dispose of foreign freight and letting Tokyo take care of domestic cargoes for its own use, thereby enabling both ports to advance their interests unhindered in different fields, and last, prevail upon the fisherman's native affection for his home city and constrain him to go farther afield in Tokyo Bay for his catch.

An Interesting Order

Amongst several large orders recently secured by The Stirling Boiler Co., Farrindgon Street, London, is one from The Brighton Corporation Electricity Works for their Southwick Power Station, which is interesting because of the combination of Radient and Convection surface superheaters, which the Stirling Boiler Company are manufacturing and installing.

The Radient superheater is arranged in each side wall immediately above the Bailey wall surface, and is composed of 2-in. tubes which are protected of their entire surface by means of special size Bailey Blocks.

The Convection Superheater is of the multi-loop type positioned between the first and second banks of the boilers.

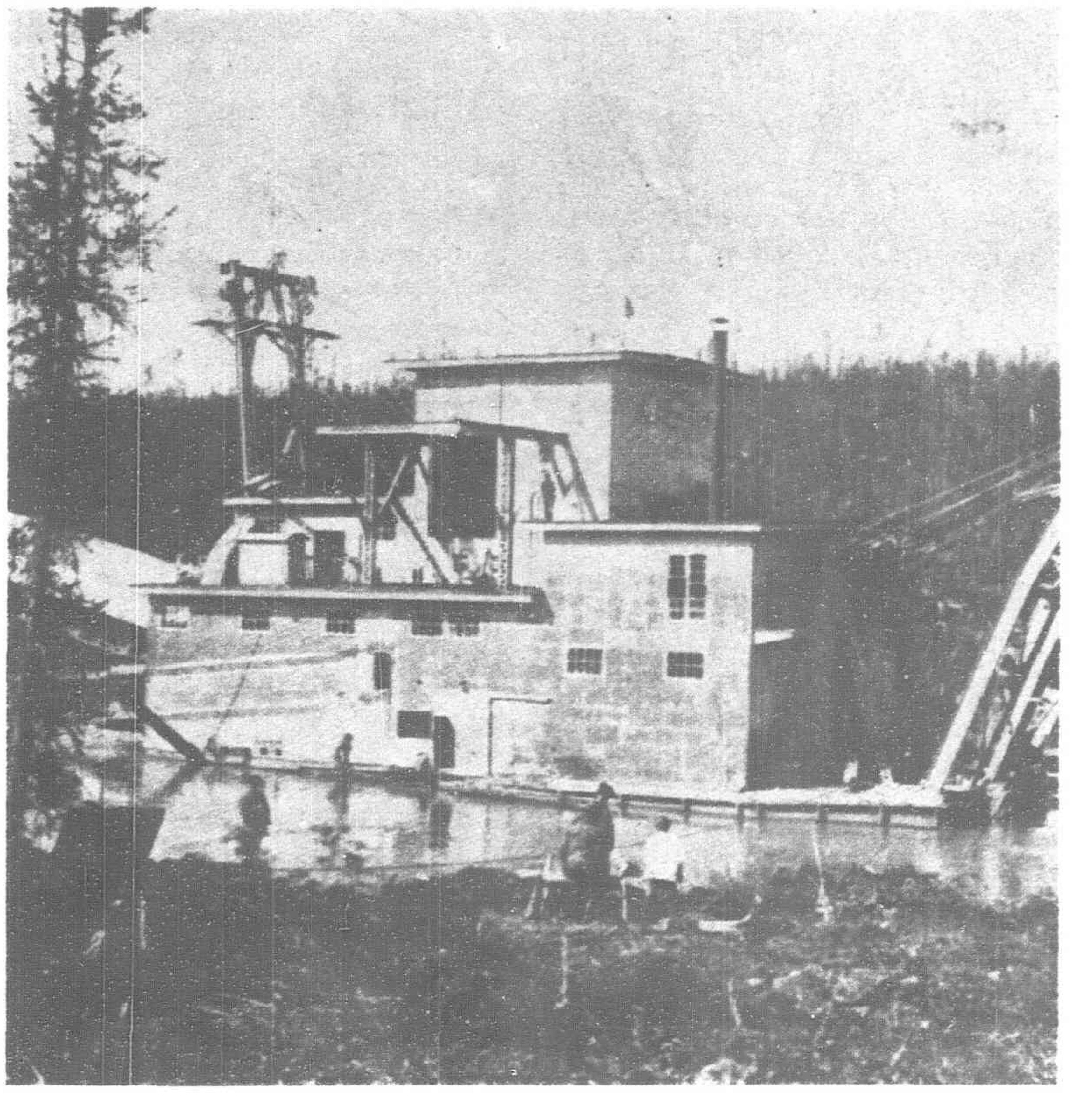
The order covers three Tri-drum Stirling boilers each having 12,828 sq. ft. of heating surface designed for a steam pressure at superheater outlet of 675 lbs. per sq. inch with a final steam temperature of 875° F.

All the drums will be solid forged and the boilers will be stoker fired, each boiler is fitted with a Stirling front water screen, the lower portion of which is protected by Bailey blocks.

The Gold Industry of the U.S.S.R[*]

THE Soviet gold industry has been showing steady progress in the past few years, and modern mechanized production is now rapidly replacing the primitive hand methods which predominated in tsarist days. From the low point of 1920 and 1921, when, due to the havoc wrought by the world and civil wars, gold production practically ceased, the industry was gradually re-established. By 1927 regular production had been restored, and the Soviet Union had regained its pre-war rank as fourth (after South Africa, the United States, and Canada) among the world's gold producers. However, output was still only about half of the 1913 figure, and the share of the Soviet Union in total world gold production had fallen to 5.5 per cent, as against 8.6 per cent in 1913. During the succeeding period, that of the first Five-Year Plan, significant strides in developing the gold industry were made. By 1931 the 1927 production figure had been doubled and last year a further increase of 17 per cent was recorded, bringing output above the pre-war level. In this connection it is interesting to note that in 1930 world output of gold amounted to only 90 per cent of the pre-war total. In the Soviet Union not only has production shown marked gains, but considerable progress has been made in improving transportation facilities and in mechanizing gold production all of which constitutes a sound basis for a much more rapid increase in output during the coming years.

Whereas the total capital invested in the gold industry before the war amounted to only about 100 million roubles, during the past four years alone a sum of nearly 500 million roubles has been invested in this industry by the Soviet Government. These investments have made possible extensive geological and other research work, the opening up of new mines, and the introduction of mechanized production in both placer and vein mining. The remoteness of the rich gold bearing districts from other industrial centers has necessitated the expenditure of considerable sums to improve transport. Hundreds of kilometers of railway lines have been laid in the gold-mining districts, and road and water transport improved. Last year's transportation program included an increase in the tonnage of vessels for the Lena River in Yakutia, the Amur in the Far Eastern Region and the Yenisei in the East Siberian Region, the building and repair of 4,500 kilometers (2,800 miles) of roads, and the opening of new airlines connecting the gold-fields with large industrial centers.



An Electric Gold Dredge in operation in the Aldan District of Soviet Yakutia

The improvement of transport not only facilitates the exploitation of the mine fields, but makes possible better living conditions both for the workers engaged in the state gold-mining enterprises and for individual prospectors. Early last year a decree was issued which provided special inducements to prospectors, such as guaranteed minimum income exempt from taxation, supplies of food and other goods at the same low prices set for industrial workers, etc. Their work is being made easier by the introduction of steam-driven pumps, hoists, and other modern equipment. At the same time, of course, large-scale mechanized production is being introduced as rapidly as possible.

While before the war mechanized production constituted only about 25 per cent of the total, this percentage reached 43 last year. During the four years 1928-1931 over 20 American-type electric dredges were installed in the various gold-fields. The Irkutsk (East Siberia), Putilov (Leningrad), and Votkinsk (Ural Region) plants turned out three or four gold dredges each in 1932, and considerable other equipment for the gold-fields is furnished by the Irkutsk and Votkinsk factories. However, the supply of machinery and equipment is still far from adequate. During the coming five years scores of additional powerful dredges, excavators, crushers, drills and scrapers, as well as a great deal of hydraulic machinery and other equipment, will be needed. Domestic production of gold-mining machinery is to be expanded, but a considerable share of such machinery as well as equipment for the new machine-building plants will be imported.

In connection with the introduction of electric dredges, about two-score power plants were built in the gold regions during the first Five-Year Plan. Additional power plants, with a total capacity many times that of the existing network, are to be completed within the next few years. The aim is to raise the share of mechanized production to 85 per cent by 1937 and to increase output to a point where the Soviet Union will approach the level of the Transvaal (South Africa), which now occupies first place in world gold production.

According to L. Shlounde,[†] British mining engineer, the "rich gold-fields of the U.S.S.R.," are destined to be "the most important available sources for gold production for the world gold market." Of the six leading gold-producing countries (South Africa, United States, Canada, Soviet Union, Mexico, and Australia), which together supply over four-fifths of total world gold production, only Canada and the U.S.S.R. have, in his opinion, good prospects for any considerable expansion of gold output. The principal goldfields of South Africa have reached or are approaching their limit, and it is considered probable that production in many areas will be exhausted within a score of years or less. Production in the other three countries has for a number of years been on the decline, and is now far below the pre-war level. Mr. Shlounde concludes: "In view of the alarming decrease and exhaustion of many other gold-bearing countries, I have described the inexhaustible sources of previous gold reserves in many explored territories of Soviet Russia, and I must conclude by saying that the gold treasure of Russia and Siberia has so far only been partially estimated."

The importance of the U.S.S.R. as a gold producer has likewise been stressed by Sir George Paish, eminent British economist. He states :[‡]

> "The South African mines are known to have a limited life and some anxiety is felt lest the world's gold supplies should prove to be insufficient to meet the requirements for banking reserves, for currency, and for ornament. . . . . In Russia gold is known to exist in large quantities and, had it not been for the war, Russia to-day would probably be producing gold on a scale that would remove all anxiety as to future supplies of this highly important metal. By developing the gold-fields of Russia, very large additions could be made to the world's gold supplies."

(Continued on page 177)

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[*] *Economic Review of the Soviet Union*, January, 1933.

[†] *British Russian Gazette and Trade Outlook*, August, 1932.

[‡] *British Russian Gazette and Trade Outlook*, February, 1932.

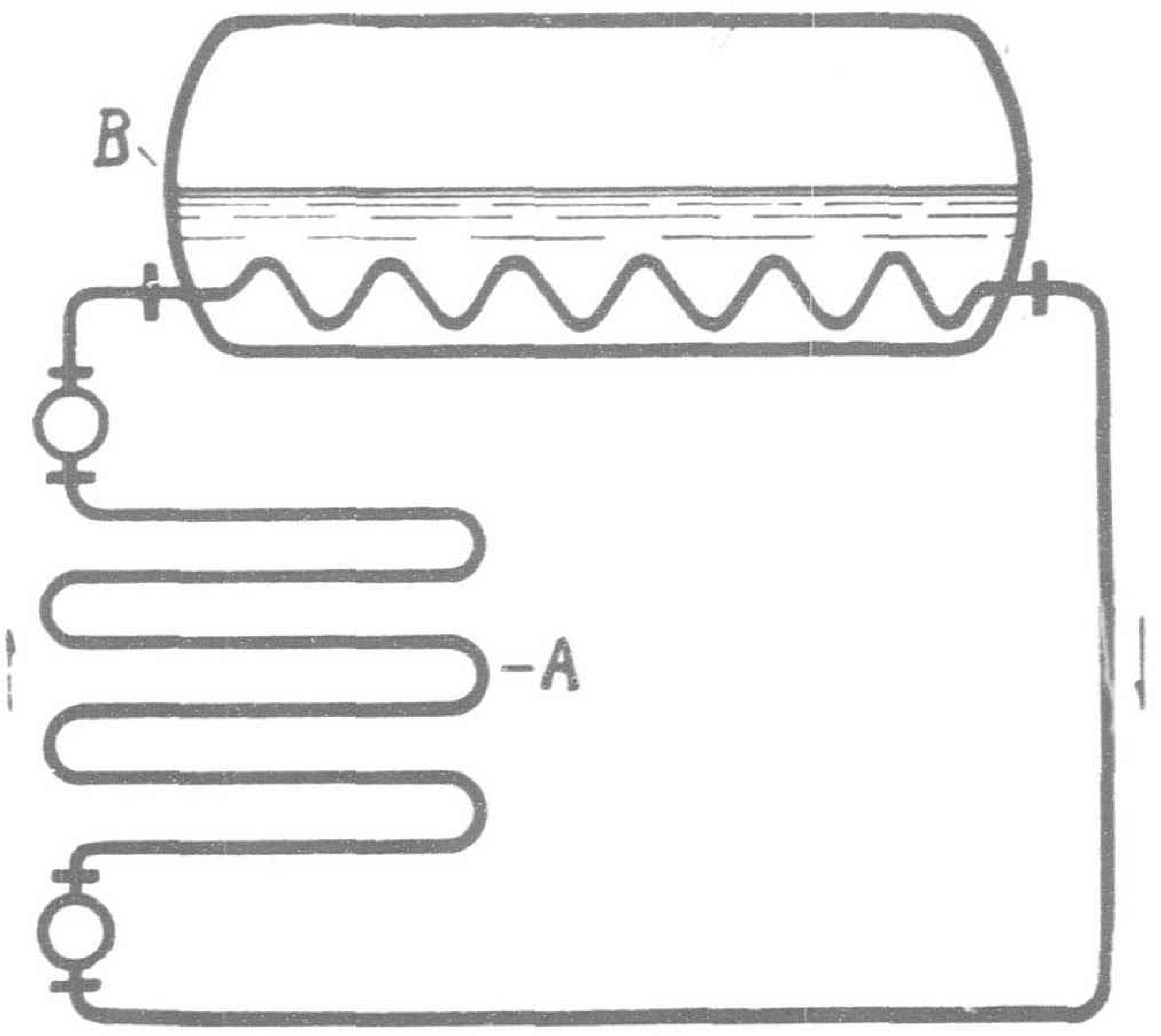
The Sulzer Single-Tube High-Pressure Steam Generator

IN recent years the endeavor to obtain greater economy in steam raising has led to a considerable rise in the pressure and temperatures adopted. The principal difficulties to be overcome in this connection were obviously found in the steam generator itself. In America increase in pressure has been developed more quickly than in Europe, whilst increase in temperature has been rather slow.

Before referring to the latest types of boilers, a short survey of the historical development of steam boilers in general may be of interest. The most important problems affecting boilers working at pressures of more than 400-550 lb. per sq. in. will be illustrated and a few special constructions for very high pressures described, amongst them the single-tube steam generator developed during the last few years by Sulzer Brothers, Winterthur.

The earliest steam boilers were made cylindrical, with rounded or hemispherical ends; they were of the horizontal or vertical type and the material used was copper, bronze or cast iron. The working pressure did not exceed 2 or 3 lb. per sq. in.

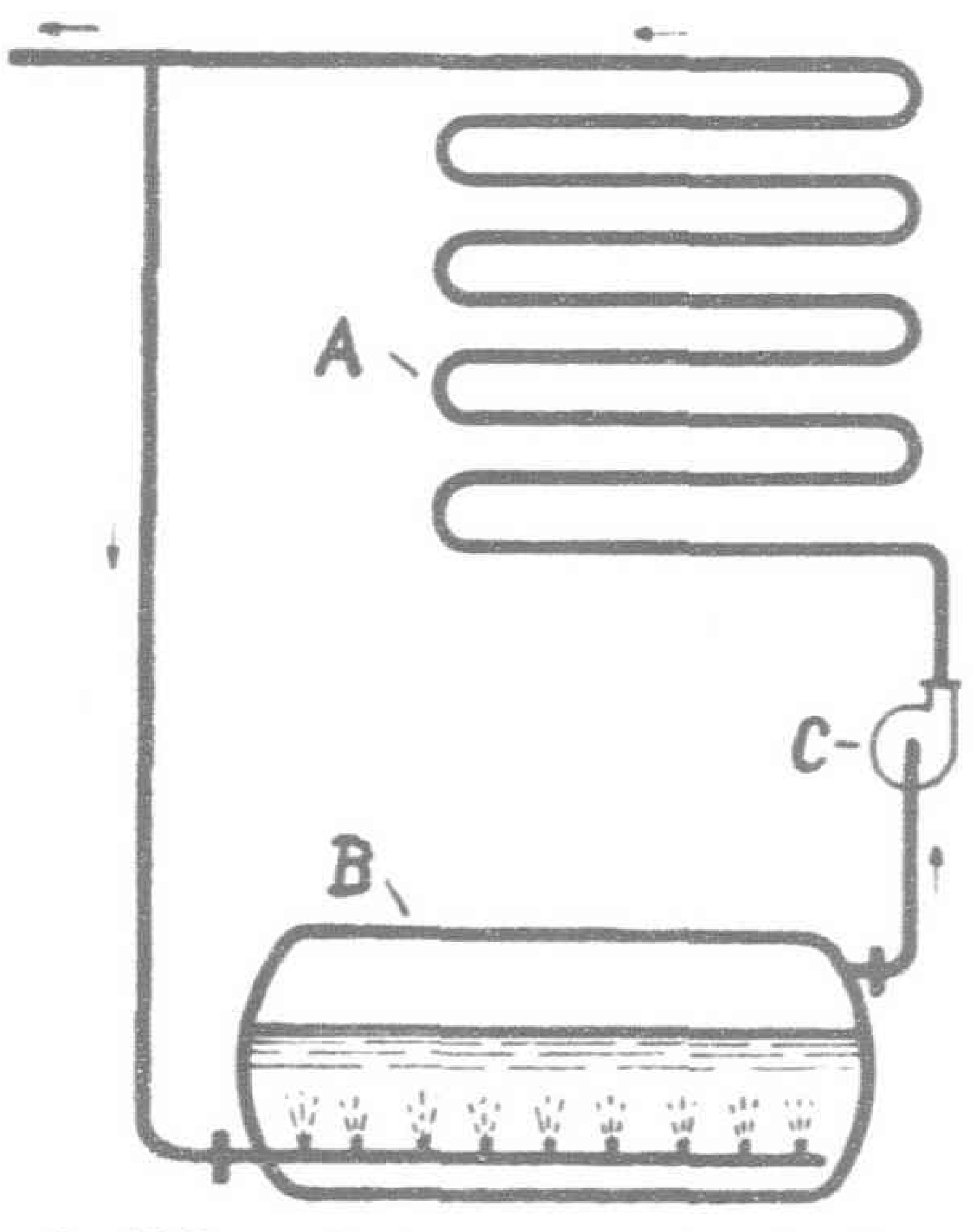
With the introduction of flue tube boilers, commonly known as the Cornish and Lancashire type, the pressure was at once increased to 85-100 lb. per sq. in.



A Tube coils in contact with flue gases.
B Lagged, indirectly heated steam drum

Fig. 1.—Diagram illustrating arrangement of the High Pressure Boiler of the Schmidt'sche Heissdampfgesellschaft

A pioneer of higher pressures was Perkins, who more than 100 years ago built a boiler consisting of a single cast iron pipe. In this boiler the water was injected into the pipe at one end, whilst superheated steam issued from the other. This arrangement, however, made it difficult to work the engines which were then available; the steam was consequently passed through water in a boiler drum, whereby it was again saturated and the superheat utilized to evaporate more water. At about the same time an experimental boiler consisting of a single coil about 100-ft. long, of tube 1/4-in. in diameter, was built in America. This construction was far ahead of its time, but proved unserviceable, so that no further developments took place. Meanwhile the orthodox cylindrical and flue-tube boilers were improved, the principal purpose of these alterations being to increase the heating surface and raise the working pressure. Then came the water-tube boiler, which was developed in Europe particularly by Dr. Alban. At first this boiler had horizontal tubes but the firm Steinmüller built a steam generator of this kind with slightly inclined tubes, and this finally led to the inclined tube boiler with headers at the front and rear, and a drum placed above.



A Tube coils in contact with the flue gases (superheater)
B Lagged steam drum with injection nozzles for heating steam
C Circulating pump

Fig. 2.—Diagram showing arrangement of Loffler Boiler

An endeavor to reduce the weight and space required led to the vertical water-tube boiler, which in the normal design for large units comprises one or two lower and one or more upper drums. The principal examples of this type are the Stirling boiler with bent tubes and the Garbe boiler with straight tubes.

The types mostly built to-day are flue-tube boilers for small installations, and inclined or upright water-tube boilers for large installations.

The question of the highest permissible temperature will always depend upon the quality of the material available; on the other hand, the pressure will determine the design of the boiler. There are two principal factors in the design of boilers employing pressures hitherto used, which are of decisive importance in determining the reliability of a super high pressure boiler:

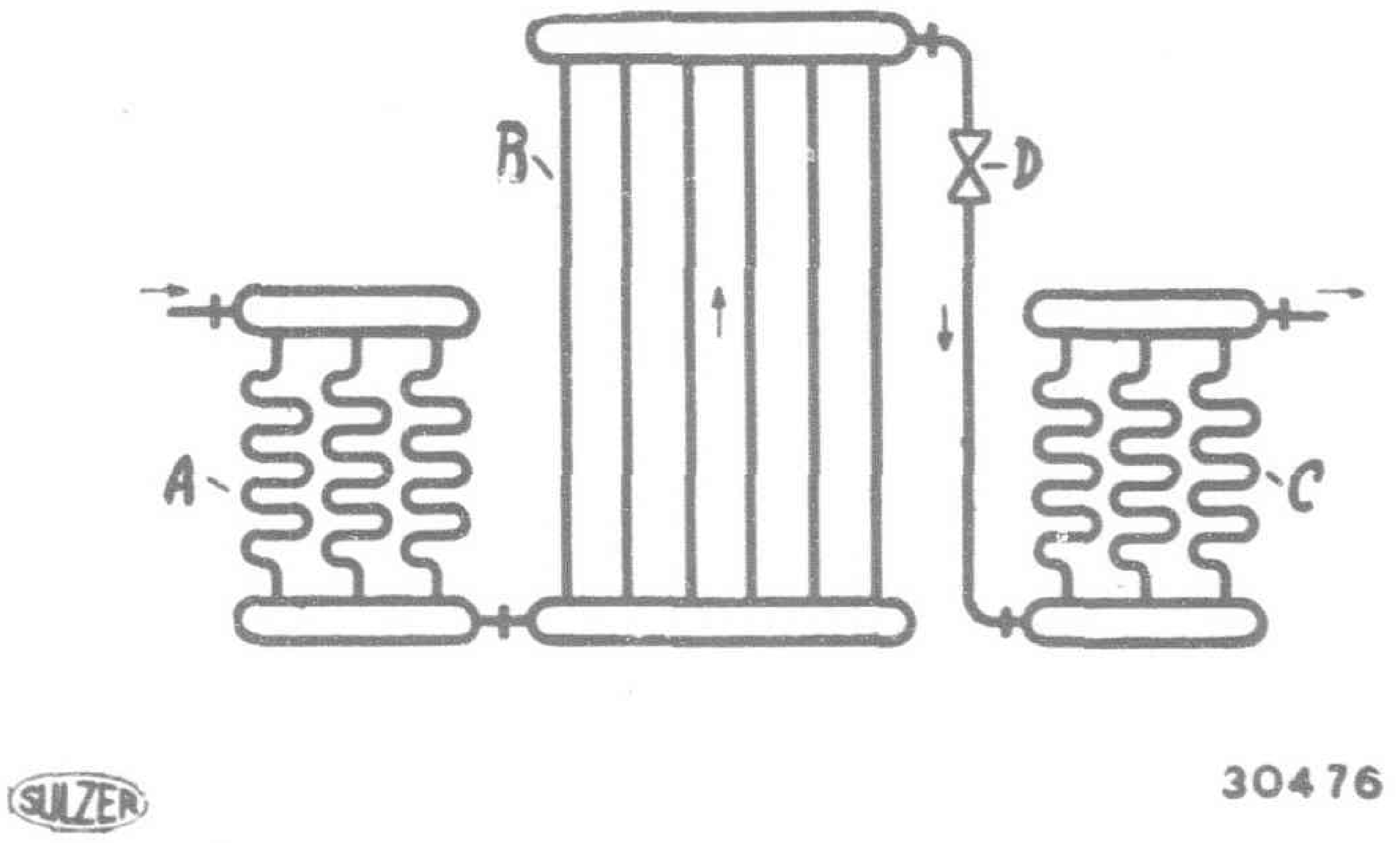
1. Obtaining a positively definite flow, in order to prevent steam bubbles clinging to the tube walls, and the consequent break down of the tubes. The difficulty in this respect is greater than with low pressure boilers, on account of the small specific volume of high pressure steam, the steam bubbles consequently being less able to push their way upwards. This when other conditions remain the same, diminishes the velocity of flow of the water or of the mixture of steam and water.
2. The prevention of deposits (boiler scale, etc.) on the interior parts of the tubes in contact with water and steam.

Greater attention must be paid to the regulation and working of the boiler, as is already the case with vertical water-tube boilers working at high pressures, in consequence of the accumulating capacity being less than in boilers with large water spaces.

Various firms have endeavored to solve these problems for boilers working at very high pressures (1,400 lb. per sq. in. or more) by further developing already known types. In particular endeavors have been made to diminish the number of drums. Sulzer Brothers, for example, in 1924 built a single-drum boiler for 1,550 lb. per sq. in., which is still in practical service to-day and has more than 16,000 working hours to its credit. This has given them an opportunity of studying all the features of high pressure design and added greatly to their previous experience of boiler construction.

In addition to the developments of known types, various special designs have been brought out, particularly in recent years, some of which seek to overcome the difficulties in quite a novel manner.

Such a design is that of the Atmos boiler, in which the evaporating heating surface consists of several rotors built up like cages from tubes, and which are mechanically rotated. In consequence of the rotation, the tube walls heated on one side from below come again into contact with water at other points, thus avoiding local heating and stresses in the material. Originally the rotors were made with large tubes, which were rotated faster than in the present-day type of this boiler. At that time the idea was to ensure that by means of this rotation the water would be distributed over the whole inner tube surface, thereby increasing the rising



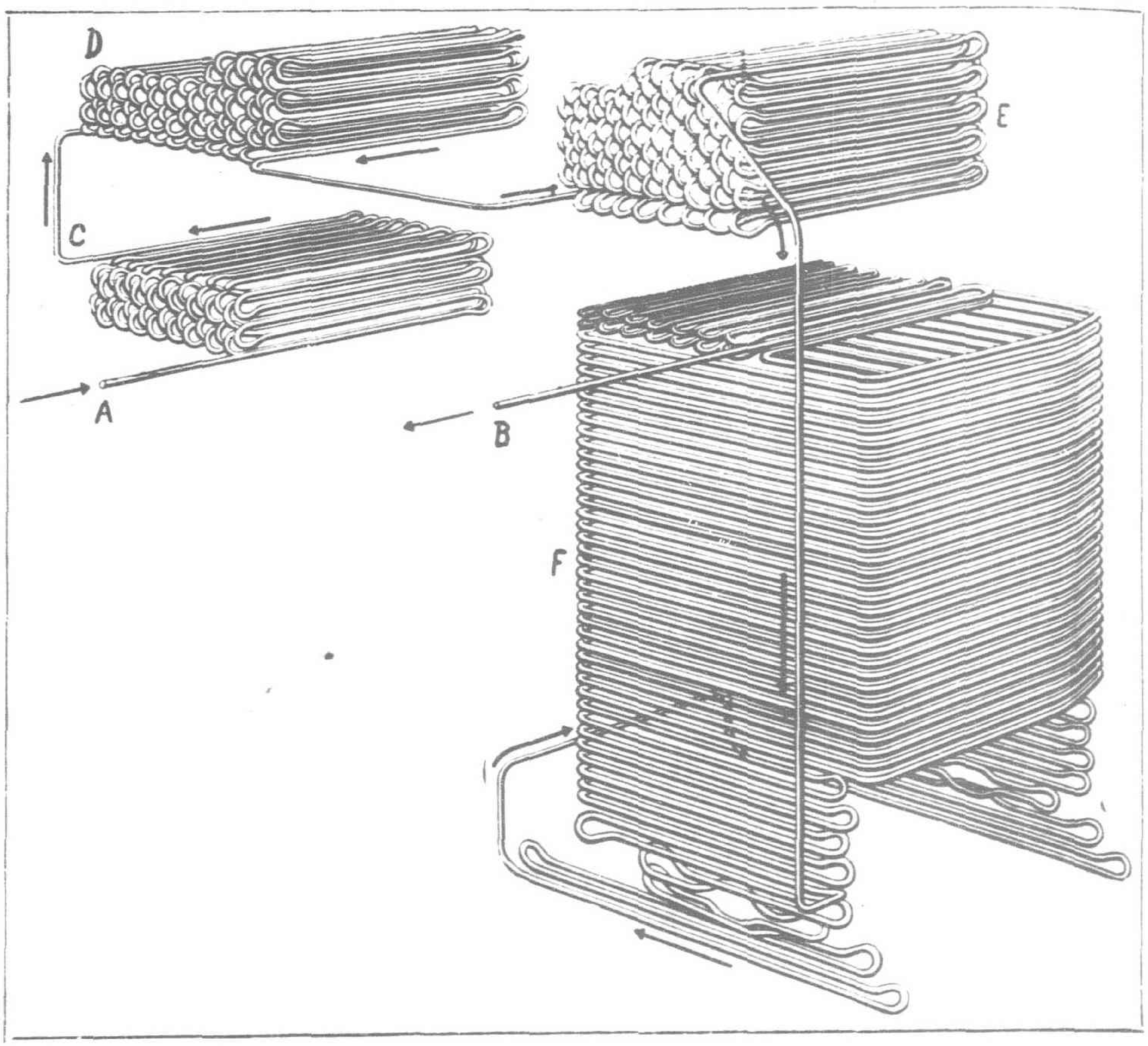
A Economizer tube set
B Part subject to radiation
C Superheater tube set
D Throttle valve

Fig. 3.—Diagram illustrating arrangement of the Benson Boiler

power of the steam bubbles directed towards the interior of the tubes. This boiler is fed with condensate.

Fig. 1 shows Schmidt's high pressure steam boiler. It works with indirect heating. Purified water, remaining under high pressure, circulates continuously in a closed tube system. This water is heated in the heating system of the furnace space and passes solely by natural circulation into the pipe coil situated in the insulated evaporator drum outside the furnace; there it gives up heat to the surrounding water and evaporates it. The process of evaporation consequently takes place outside the heating surfaces in contact with the fire, so that these heating surfaces are kept free from incrustation. This boiler is generally fed with chemically treated water.

Fig. 2 is a diagrammatic illustration of the Löffler boiler. Also in this case indirect heating is adopted, but the medium transmitting the heat is not water, but superheated steam. Only one-third to a quarter of the quantity of steam issuing from the superheater is employed in doing actual work. The rest flows through nozzles into the unheated and insulated evaporating drum in which the pressure is somewhat lower; there the steam mixes with the surrounding water and evaporates it, giving up its superheat. The saturated steam thus raised is drawn off by a circulating pump and forced into the pipe system heated by the flue gases, where it is superheated. In this process the circulation is positive, in consequence of the adoption of a circulating pump. Here also the feed is generally chemically treated water.



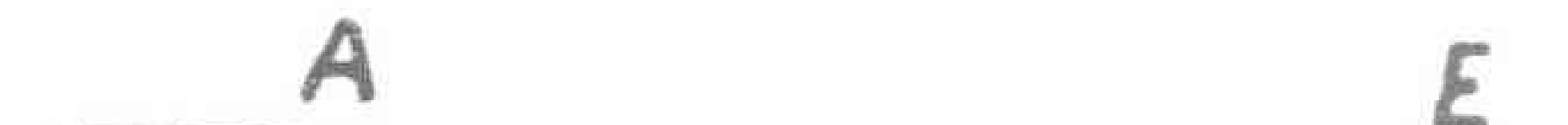
A	Feed water inlet	C, D, E	Coils in contact with flue gases
B	Superheater steam outlet	F	Coils heated by radiation

Fig. 4.—Model of Tube in a Sulzer Single-Tube Steam Generator

Fig. 3 shows the Benson boiler diagrammatically. In this type the formation of steam bubbles is avoided because the water is converted into steam at the critical pressure (3,200 lb. per sq. in.). In this state there is no difference between water and steam. The high pressure steam is throttled down to the desired service pressure, whereby its temperature falls; after throttling, the steam is again superheated. The boiler has no drums and consists of a system of tube coils arranged in parallel, with headers intercepted at certain intervals. The water is pumped through this system. Condensate is mostly used for the feed.

In addition to the special designs described above there now comes the latest,—the single-tube steam generator developed in recent years by Sulzer Brothers.

The principal reasons which led to the development of this special type of boiler were the following. In addition to the technical difficulties mentioned above, the high price of the boilers was an impediment to the introduction of extra high pressures causing capital charges to make it doubtful whether high pressure plants would prove more economical in service. In this respect, high pressure boilers fitted with drums are at a disadvantage, in consequence of the high cost of the drums. The same applies also to systems with indirect heating, since in them the total heating surface is greater and consequently more expensive than in other systems with direct evaporation. It was consequently necessary to endeavor to design a type of boiler as simple as possible, without drums and consequently inexpensive, the requirements of maximum reliability in service being of course duly considered. Even some existing systems show certain defects in this respect.



A	Single tube steam generator
B	Reciprocating feed pump (speed adjustable)
C	Feed water tank
D	Thermostat
E	Isothermol regulator
F	Feed water regulator
G	Injection valve

Fig. 5.—Diagram showing temperature and feed water regulation in the Sulzer Single-Tube Experimental Steam Generator

The experience gained with the types of boilers hitherto constructed were taken into consideration when designing the Sulzer single-tube steam generator.

A forerunner of the new Sulzer steam generator was the boiler already mentioned as built in America with a tube about 100-ft. long and 1/4-in. in diameter. A few similar boilers were also built in Sweden towards the end of last century; but they did not prove satisfactory on account of various drawbacks which were not sufficiently recognized at the time.

In designing the Sulzer single-tube steam generator special consideration was given to the following points:

1. In order to avoid steam bubbles clinging to the tube walls, the speed at which the working medium flows through the boiler is increased. To be certain of obtaining sufficient speed at every point, the steam generator is constructed as a single-tube of great length, the feed being pumped into one end and the steam issuing in a superheated state from the other. On account of the positive flow it is absolutely impossible for the steam to remain stationary anywhere; the mixture of water and steam hurries as a froth through the tube in the evaporating zone. Also in consequence of the positive flow, it is unnecessary to take any of the precautions previously required for ensuring circulation in the tube which is led in many coils through the hot flue gases. Consequently it is possible to meet the special requirements of any particular case.
2. Condensate is preferably used for feeding the boiler, since all experience made with the former high pressure boilers

has shown that the use of condensate is still the most certain way to avoid deposits forming on the tubes.

3. Since the steam generator is constructed as a single continuous tube, expensive boiler drums are eliminated. The storage capacity and also the energy capacity are, however, low and measures had therefore to be taken so that the rate of evaporation should be rapid enough to suit fluctuations in service conditions. This is effected by adopting completely automatic regulating devices, which keep the steam pressure and temperature always approximately constant, and regulate the quantity of feed to comply with the heat of the furnace. According to circumstances, the firing is also automatically regulated, for example in accordance with the pressure in the steam pipes, or in plants with low pressure steam storage, in accordance with the pressure at which the steam is stored. Through the regulating apparatus, which are connected with automatic safety devices, attendance on the steam generator is greatly simplified, consisting only in superintending the regulating devices.

The principle of the Sulzer single-tube steam generator is shown diagrammatically in fig. 4.

Based on theoretical considerations, a simple experimental steam generator was constructed, on which thorough experiments, now concluded, were carried out. Special tests were made with various arrangements of the tube coils, and a number of different methods of regulation were also tried.

No detailed description of a complete plant will be given here at present, but it might be mentioned that the continuous tube of a steam generator, capable of raising 10 tons per hour, now under construction has a length of 1½ miles.

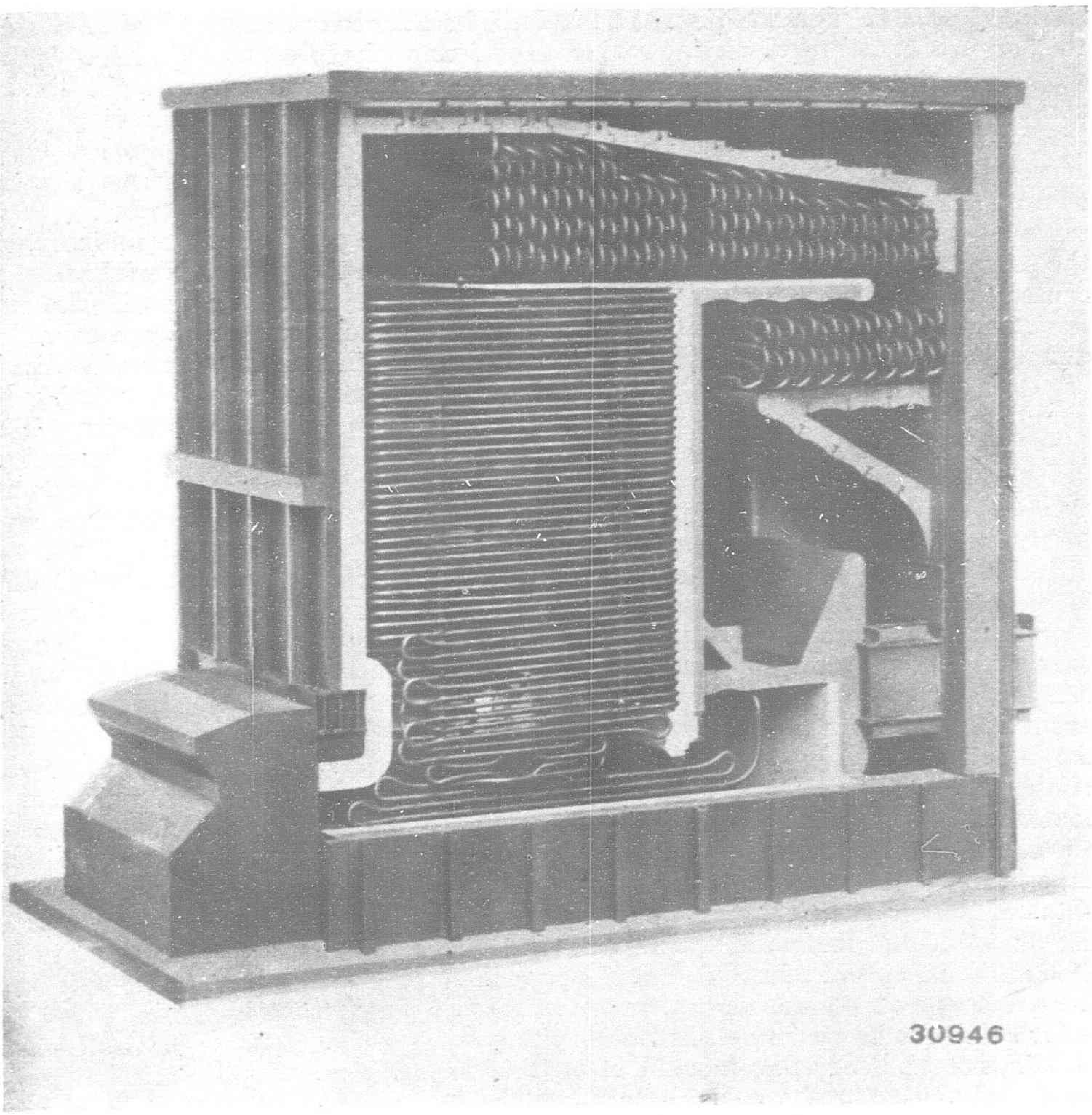
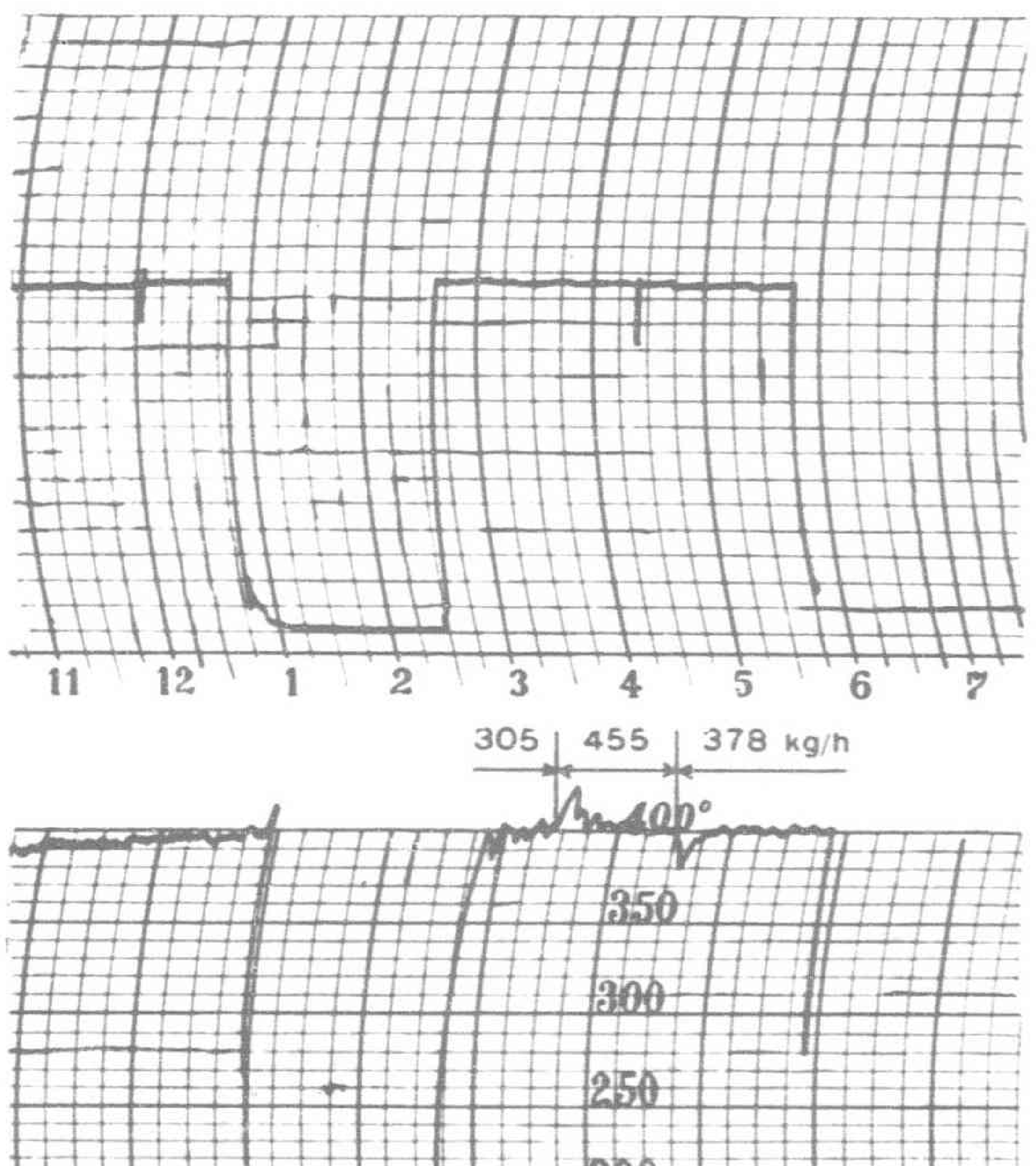


Fig. 7.—Model of a Sulzer Single-Tube Steam Generator



Upper chart: Working pressure 1,280 lbs. per sq. in. (90 arm.) gauge (from 12.55 to 2.30 the boiler was not fired)
Lower chart: Steam temperature
Figures between charts: Oil burned in kg. per hour

Fig. 6.—Pressure and temperature charts taken during a test with the Sulzer Single-Tube Steam Generator

Fig. 5 shows one of the methods adopted for regulating the temperatures and the quantity of feed water, the pressure and temperature curves obtained during a regulating test being shown in fig. 6.

In order to simplify as far as possible the steam generator with which the first experiments were made, it was equipped with oil firing, since this had the advantage of being so easily regulated that large alterations could be made in the intensity of heating and the corresponding behavior of the regulation could therefore be easily and thoroughly studied. The steam generated was throttled, and in summer was condensed in a turbine condenser since there was no means of utilizing it; in winter it was used to supplement the heating of the works.

The regulation works as follows:—

A pressure regulating valve, not shown in fig. 5, keeps the steam pressure at the superheater outlet always constant, thereby preventing any water issuing from the steam generator.

The rate of feed is automatically regulated to correspond with the intensity of firing, by changing the speed of the reciprocating feed pump. By means of this regulation, the steam temperature at the outlet of the steam generator is also more or less regulated, the regulation being the more accurate the slower the intensity of heating changes. With rapid alterations in the load this regulation alone would be insufficient, because of the great length of the tube. Consequently an additional small quantity of feed water is injected before the superheater for fine regulation of the temperature. The quantity of feed water and also the additional quantity injected are regulated by the same member, the temperature control device 1 at the outlet of the superheater. This same device 1 changes the oil pressure in the system 2 in accordance with the temperature of the steam flowing through the thermostat tube 3. Through the valve 4, the oil pressure in system 2 is increased by the oil pressure in system 6, which is influenced at the same time by the tension of the spring 5. The latter pressure acts at 7 on the control member of the servomotor 8, the position of the piston of this servomotor determining the speed of the feed pump 9 and consequently the quantity of water fed to the steam generator. The oil pressure in the system 6 also influences the control member 10 of the servomotor 11, which regulates the quantity of additional feed water injected. 12 and 13 are levers for compensating motion of these control pistons.

In consequence of the adjustment being the same under all conditions, the temperature would become higher when raising steam at a high rate than at a low rate; in order to overcome this, an isothermal regulator is provided, consisting of the control valve 14 and the servomotor 15, so as to keep the temperature constant when the steam generator is working steadily, as well as when the load varies. The control valve 14 is its middle position only at normal steam temperature. Any alteration from this temperature causes oil to flow through the throttling member 16 to the servomotor 15, to or from the control valve 14. The position of the servomotor piston, however, increases the tension in the spring, consequently influencing the oil pressure in system 6. Since the ssrvomotor piston is in motion as long as the steam temperature differs from the value it should have, the oil pressure in system 6 is also kept changing until the quantity of feed water and the quantity of additional feed injected are such as is required to keep the steam temperature exactly constant.

The very favorable results obtained with this method of regulation are clearly demonstrated by the curves in fig. 7. Alterations in load were obtained by suddenly changing the speed of the fuel injection pump. The quantities of fuel burned per hour are shown in the diagram. The quantity of water evaporated in the steam generator was approximately proportional to the amount of fuel burned. The diagram shows that by increasing the amount of fuel by 50 per cent, the temperature rose by about 20° C. After about 20 minutes it had again reached its former value. Decreasing the quantity of fuel by about 17 per cent, gives a temperature fall of about 20° C. The steam pressure, however, remains practically constant.

Based on the very favorable results obtained with the new experimental steam generator, Sulzer Brothers have already obtained two orders for this type, one for a steam generator evaporating about 18,000 lb. per hour and another for a steam generator with a normal output of about 40,000 lb. per hour. In both cases the pressure is 1,400 lb. per sq. in. The larger steam generator is for a district heating plant in Zurich from which the numerous buildings of the Federal Technical University, a hospital and several blocks of houses in the neighborhood will be heated.

Fig. 7 shows a model of the Sulzer single-tube steam generator.

The Siamese Market for Electrical Apparatus

By *JOE D. WALSTROM, U.S. Assistant Trade Commissioner, Bangkok*

THE classification of "electrical goods and apparatus including machinery" accounts for one of the largest items imported into Siam. For the past three years the United States has been getting a considerable share of this business, although for the 1930-31 fiscal year American importations showed a decline, and Germany became the most important source of supply.

SIAMESE IMPORTS OF ELECTRICAL APPARATUS, FISCAL YEAR ENDED MARCH 31

Country of origin	*1929-30* *Quantity Kilos*	 *Value*	*1930-31* *Quantity Kilos*	 *Value*
Germany	561,187	$419,165	700,338	$455,723
United States ..	366,812	426,703	317,582	305,926
Hongkong	214,192	274,647	312,132	304,623
United Kingdom ..	865,578	340,214	419,760	249,732
Netherlands	50,431	41,798	45,075	91,572
Singapore	212,476	170,675	101,697	80,371
Japan	182,660	73,324	205,684	74,149
Penang	63,935	76,644	108,133	70,711
Belgium	102,870	52,781	111,089	44,517
Other countries ..	200,035	169,248	102,041	63,536
Total	2,820,176	2,045,199	2,423,531	1,740,860

A large part of the consignments from Singapore, Hongkong, and Penang are transhipments from other countries, and some of this trade includes American merchandise. In 1930-31 these consignments from Hongkong included a value of $69,045 from the United States, that of $48,518 from Singapore was also of American origin. This brings the American share to $423,489, or 24 per cent of the total imports for 1930-31. Figures of transhipments for previous years are not available.

Practically all electrical equipment brought into Siam comes through Bangkok, which is the only large city and the principal distributing center. Agencies for the heavier electrical apparatus and machinery, such as motors, power-plant equipment, telephone material, etc., are handled through the local engineering firms, while such electrical equipment as flashlight batteries, radio receiving apparatus, household appliances and storage batteries are usually merchandised through general trading companies.

Owing to the fact that all imports are grouped under one category, it is somewhat difficult to analyze the material furnished by the various countries. It is known, however, that imports from Germany consist largely of radio and telephone equipment, heavy electrical equipment such as power plants and generators, motors, and fixtures and household appliances and miscellaneous electrical material. Those from the United States comprise largely flashlight batteries, radio and telephone equipment, storage batteries and spark plugs, small generators and transformers, fans, and household refrigerators. The principal items from the Netherlands are incandescent bulbs and radio equipment. The United Kingdom and Japan furnish a wide variety of electrical merchandise, a sizable portion of which comes through Singapore and Hongkong, respectively. The electric plant in Bangkok is partly Belgian controlled, and imports from Belgium are consequently believed to represent some power-plant equipment.

One reason for the increase in Germany's share for 1930-31 is the fact that several electric plants of German origin were installed in three or four Siamese towns during the past year. Competitive proposals were requested by the Government, and the German bidder was awarded the contract. During the past few years there have also been several American power plants installed in various towns in Siam.

The largest single items in the trade with the United States is believed to be flashlight batteries. The United States export statistics indicate that the value of these batteries shipped to Siam in 1930 amounted to $127,000, plus the additional quantities which came in as imports from Hongkong. This figure dropped in 1931 to $79,551, although exports of flashlight batteries to Hongkong were valued at $204,912. The trade through Hongkong is largely the result of the Hongkong exchange fluctuations, which during the past two years has often made it more advantageous for Bangkok to order from its Hongkong connections rather than import direct from the United States. American flashlight cells have a leading position in Siam, which they have been able to maintain by superior quality, competitive prices, active representation and distribution, and the advantage of having been firmly established in the local market.

Household refrigerators is another line in which American manufacturers control the market. Owing to the small number of people in a position to purchase electric refrigerators, Siam is not a very large potential market. The Bangkok power company has largely overcome this factor, however, by offering an American line of refrigerators on a monthly rental basis, electric current included. This plan has succeeded of disposing of a sizable number, although incidently curtailing the sales of competitive refrigerator lines.

American radio equipment has a good reputation, although the radio business has declined to a considerable extent and importations at present are quite small. Another factor which restricts the sale of American radio equipment is the foreign competition. Both the German Telefunken and the Philips company of the Netherlands have strong agencies in Bangkok, and they obtain the larger part of the business.

Siam does not present a very attractive market for electric household appliances such as vacuum cleaners, washing or ironing machines, exercising machines, heaters, irons, toasters, percolators, and hot plates. Factors which militate against a large potential sale of such merchandise are: A very small class of people who could be considered prospective customers; no special need for such labor-saving devices, as all work is done by servants; the relatively high cost of electric current in Bangkok, which is the only important market for such appliances. Though there is a limited quantity of such merchandise offered for sale, the prices of the American products have generally been too high to permit them to get a satisfactory share of the business.

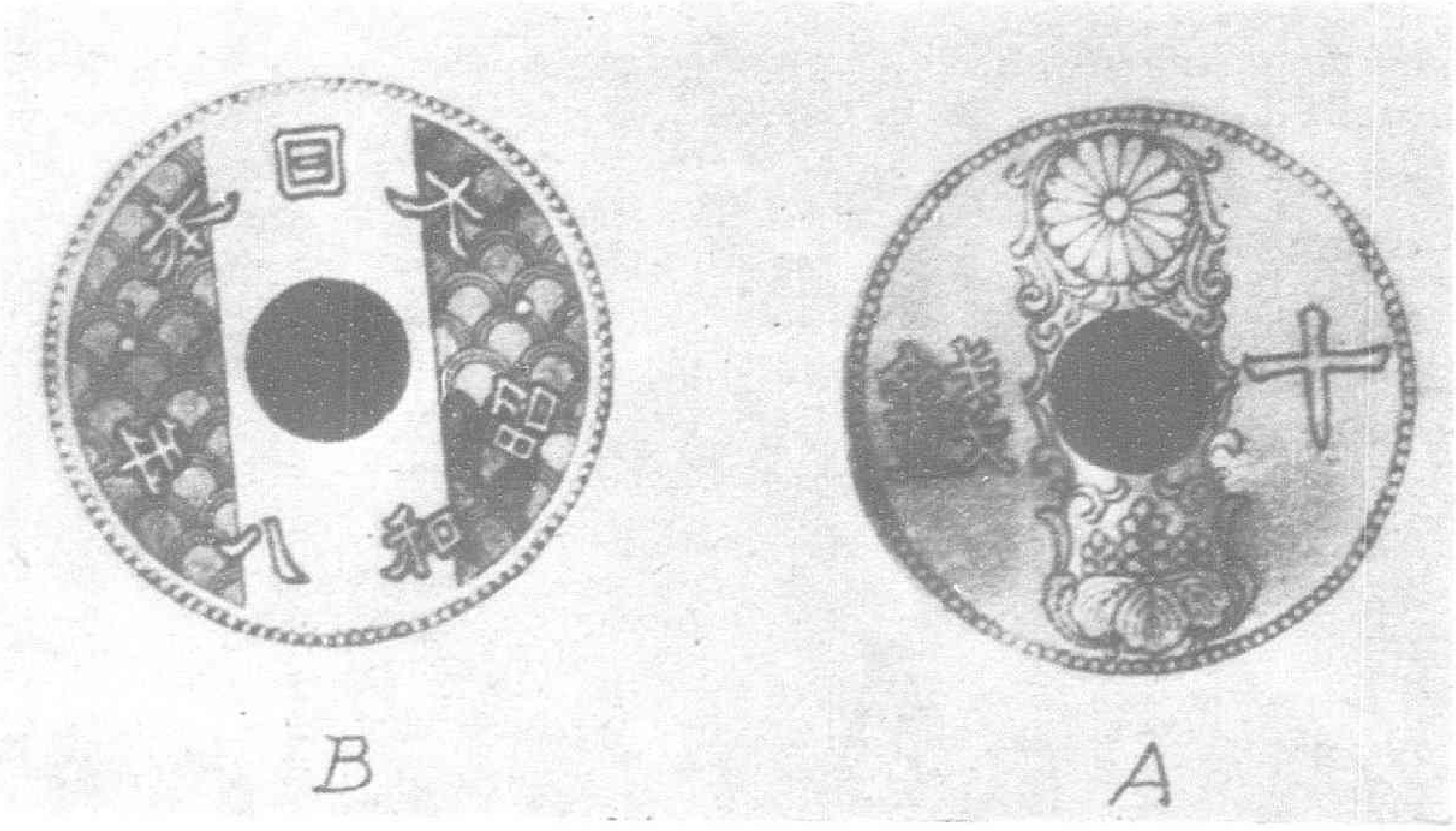
Japan Adopts Pure Nickel Coinage

By JAMES A. RABBITT, Adviser to the Japan Nickel Information Bureau, Tokyo

Japan, the land of art, has always been foremost in the exquisite design and workmanship of her coinage. Now, by adopting nickel, the hardest and most counterfeit-proof metal known for coinage, Japan has gone utilitarian, but by obtaining the design for the new coins through a popular contest in which 7,359 individuals participated from all quarters of the Empire beauty has not been sacrificed. The popularity of this contest is indicative of the interest shown by the Japanese in all matters which call for artistic expression.

The prize of Y.500 for this contest was awarded on March 15 to Mr. Shigeru Koyama of No. 73 Minami-cho, Umedzu, Ukyoku. Kyoto.

Photographs (A) and (B) of the obverse and reverse sides of the successful design keep to the chaste simplicity of all Japanese artistic expression. The face, photograph (A), carries at the top the Imperial chrysanthemum *(Kiku-no mon)*, the use of which is not permitted to any person in Japan but His Imperial Majesty.



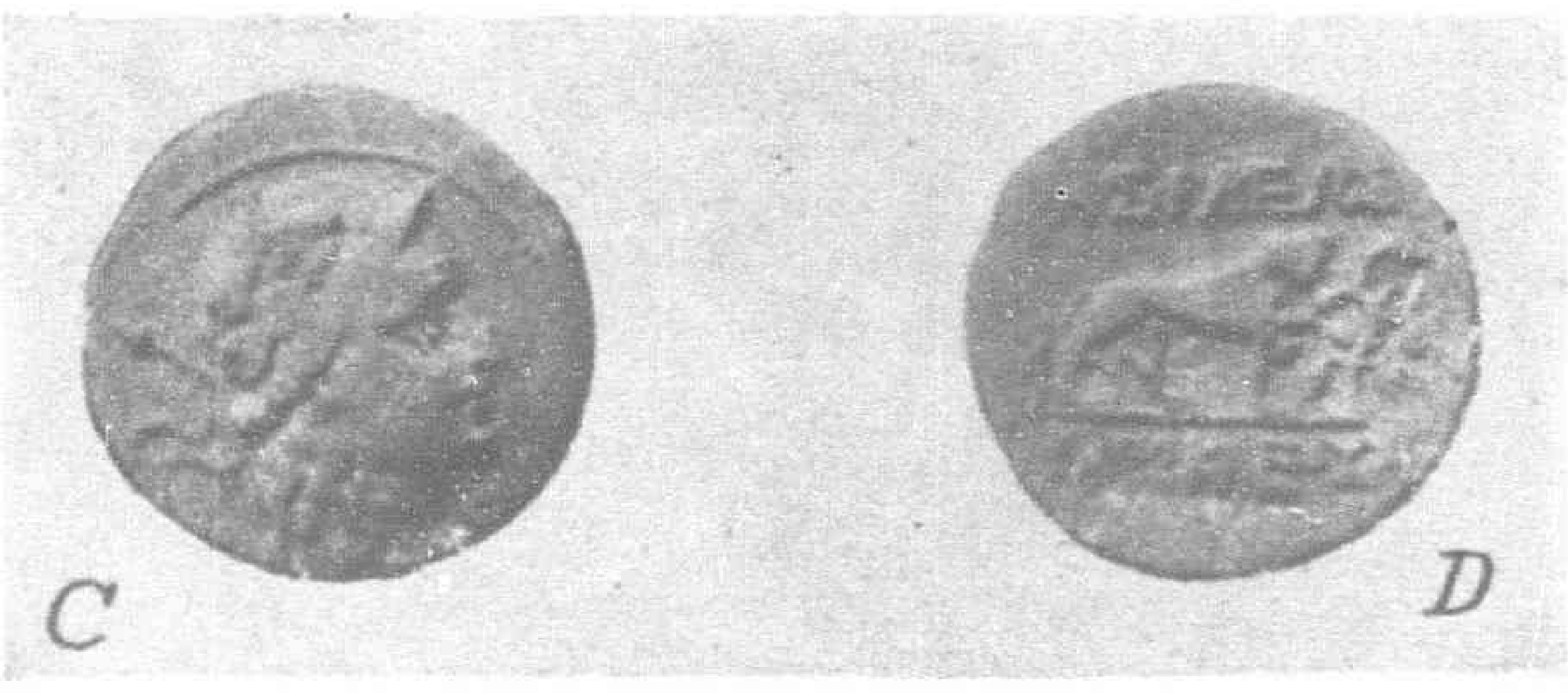
Prize Winning Design

In the lower part of the face of the coin is the paulownia flower crest, which is the crest of the Empress, called in Japanese *kiri-no mon.*

Honorable mention with prizes of Y.100 each were given to Mr. Akira Tanabe, of the city of Matsuyama, and four others.

The design shown in the photographs is to be common to both the five and ten sen pieces, although the inscription on the design in the photographs is for the ten sen coins.

There is a vast difference between the design of this ultra-artistic Japanese coin and the first nickel coin in existence, which is in the British Museum, bearing the effigy of Ruthydemus II, who was the Grecian King of Bactria reigning in 235 B.C. The obverse and reverse sides of this coin are shown in photographs (C) and (D).



It is interesting to note that this Bactrian coin was made of nickel alloy which, it is assumed, was brought from China as *pei-tung* or *pakfong* (white copper).

This Bactrian coin is composed of the following elements:

Copper	77.585%
Nickel	20.038
Cobalt	0.544
Iron	1.048
Tin	0.038
Silver	Trace
Sulphur	0.090

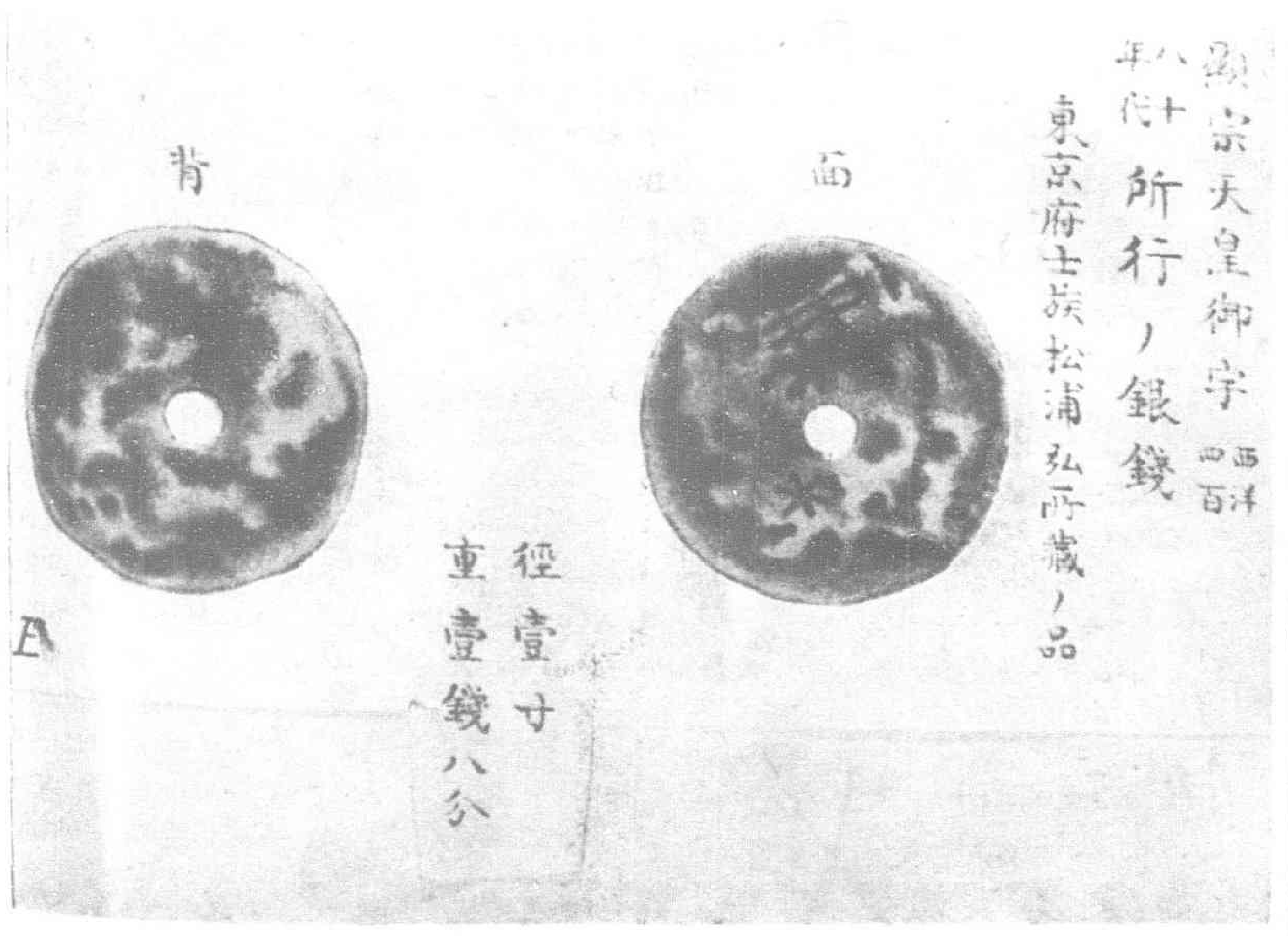
Japan has perhaps the most consistently artistic and continuous coinage known to the history of the world. The first known coins in Japan were of silver, as shown in photograph (E), which were in circulation during the reign of the Emperor Kenzo, about 485 A.D. The diameter of these coins was about 1 *sun* (1.2-in), and the weight 1.8 *sen*.

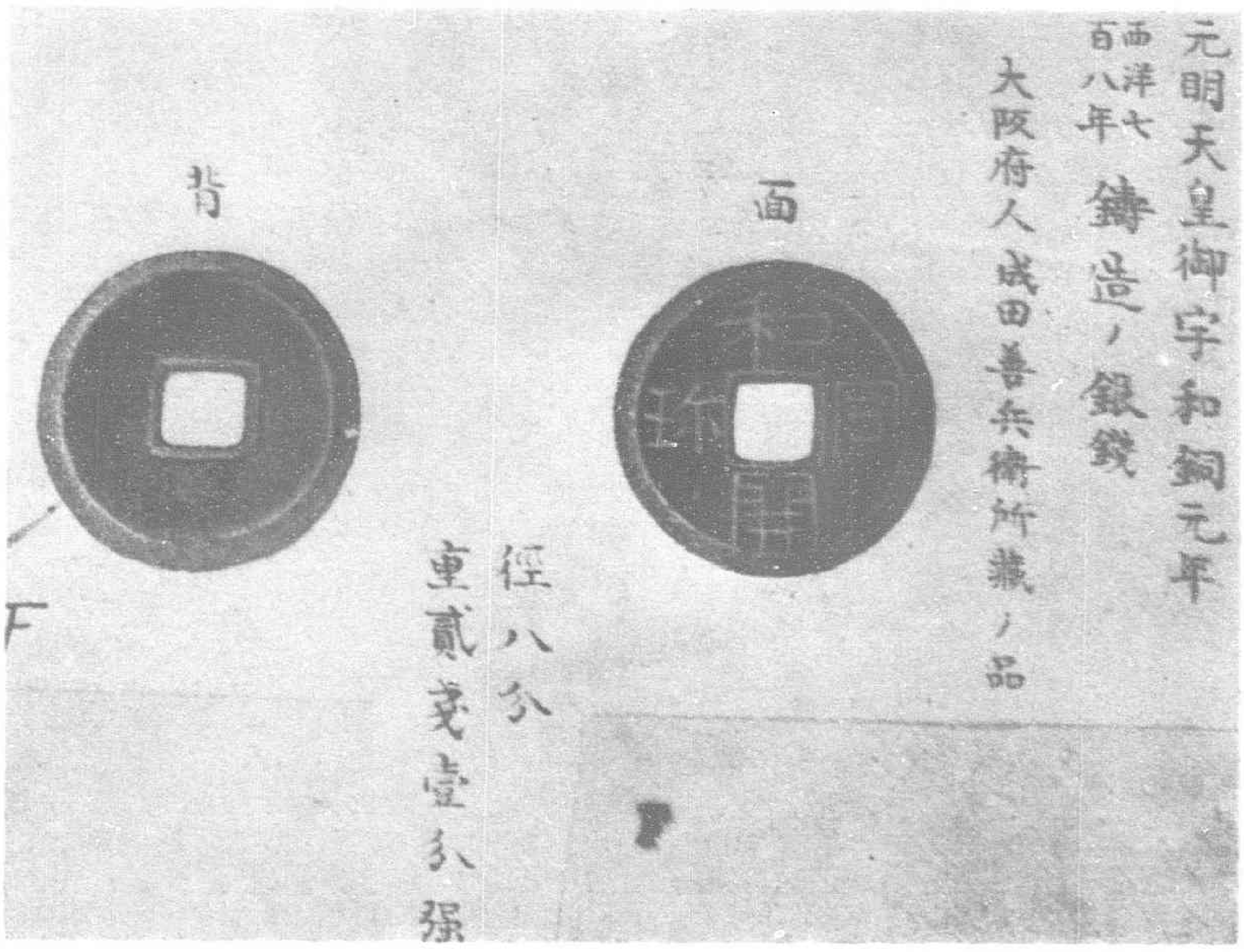
Photograph (F) shows silver coins in circulation during the reign of the Empress Gemmei, about 707 A.D., with diameter unknown and a weight of 2.1 *sen*.

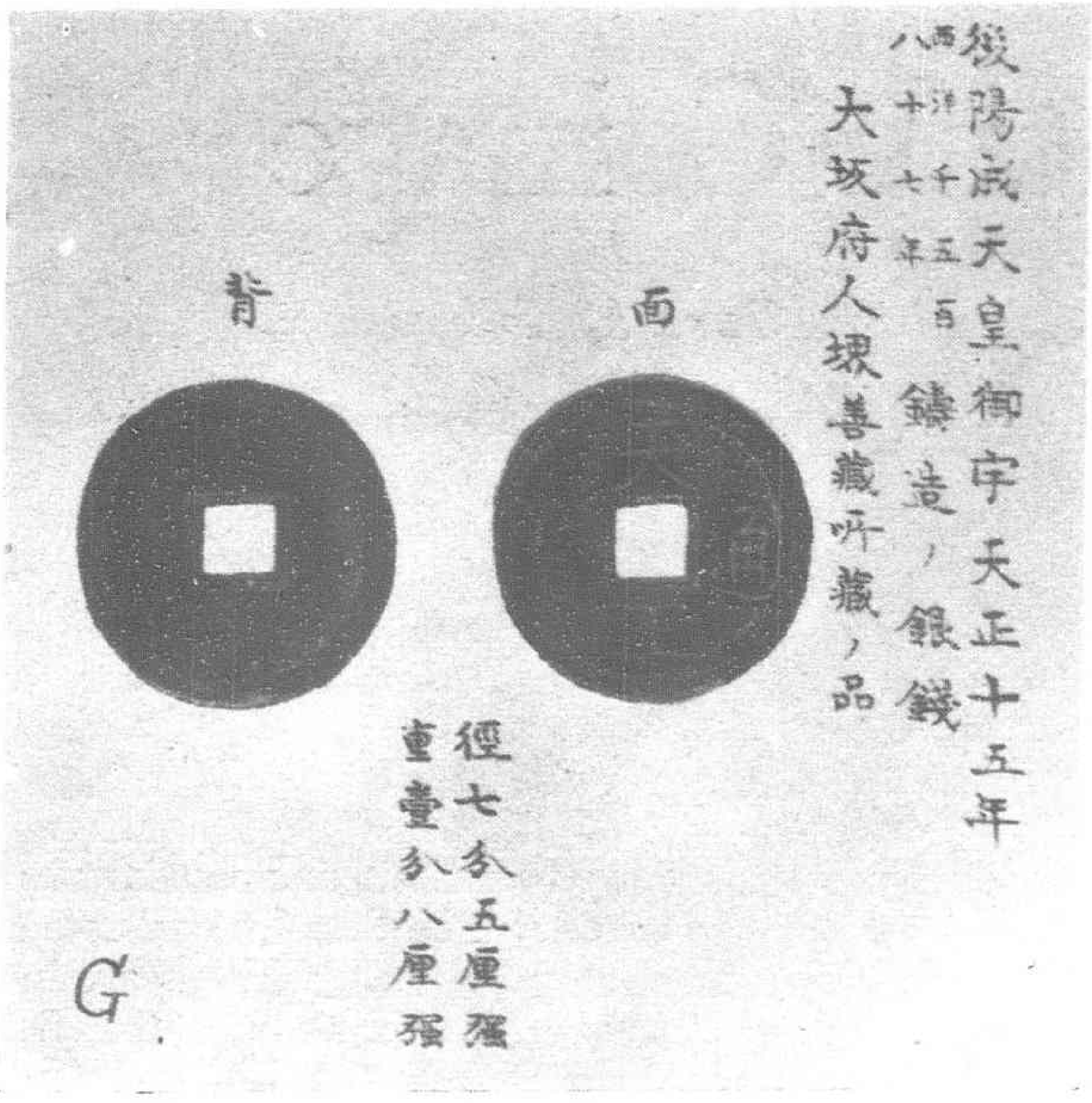
Photograph (G) shows silver coins in circulation during the reign of the Emperor Goyozei, about 1587 A.D., with a diameter of 0.75 *sun* (.9-in.) and a weight of about 0.18 *sen*. The real money in circulation, however, during the reign of the Emperor Goyozei was gold coin with the paulownia crest, which is the same as that on the new nickel coins shown in photograph (A). The length of these gold coins was 5.45 *sun* (6.54-in.), the width 3.5 *sun* (4.2-in.) and the weight 43.25 *sen*.

These giant coins which came into prominence during the reign of the Emperor Goyozei (1570 – 1580) continued to be popular throughout the Tokugawa era (1606 – 1858), the paulownia crest being most extensively used on coinage throughout this period. The ten Ryo silver coin, shown in photograph (H), is a good example.

The first use of the chrysanthemum which the author has been able to find was in the forty-three sen silver coin of the same period as the coin mentioned




元明天皇御宇和銅元年（西洋七百八年）鑄造ノ銀錢
大阪府人成田善兵衛所藏ノ品
面
背
徑八分
重貳匁壹分強
F



above, as shown in photograph (I). The length of this coin was 3.2 *sun* (3.84-in.) and the width 1.2 *sun* (1.44-in.), and it is quite apparent from its shape that it was a handful. It is interesting to note that this coin carried both the impression of the chrysanthemum and of the paulownia flower.

Note.—Ryo—1.3223 ounce (avoirdupois)
Sen—1/10 Ryo—0.13223 ounce

A very interesting design in coins is shown in the silver five sen piece which was in circulation during the reign of the Emperor Go-Momozono (1772), in photograph (J).

The introduction of modern coinage came with the establishment of the Imperial Japanese Mint at Osaka in the 4th year of Meiji (1871). From the beginning the Mint made an international reputation because of the fineness and beauty of the coins produced, a few of which, including the first five and ten sen coins, are shown in photograph (K).

The Mint has a yearly capacity for minting gold, silver, nickel and copper coins of Y.152,500,000, and also carried on as a subsidiary business.

(*a*) The refining of gold and silver, and certification of quality;
(*b*) The manufacture of precious alloys;
(*c*) The assay of minerals;
(*d*) The manufacture of medals and stamps.

The Mint covers an area of 25 acres, having 108 detached houses for dwellings for officials, and 200 houses for workers.

The accompanying flow chart indicates the completeness of operations, which in 1931 produced the following:

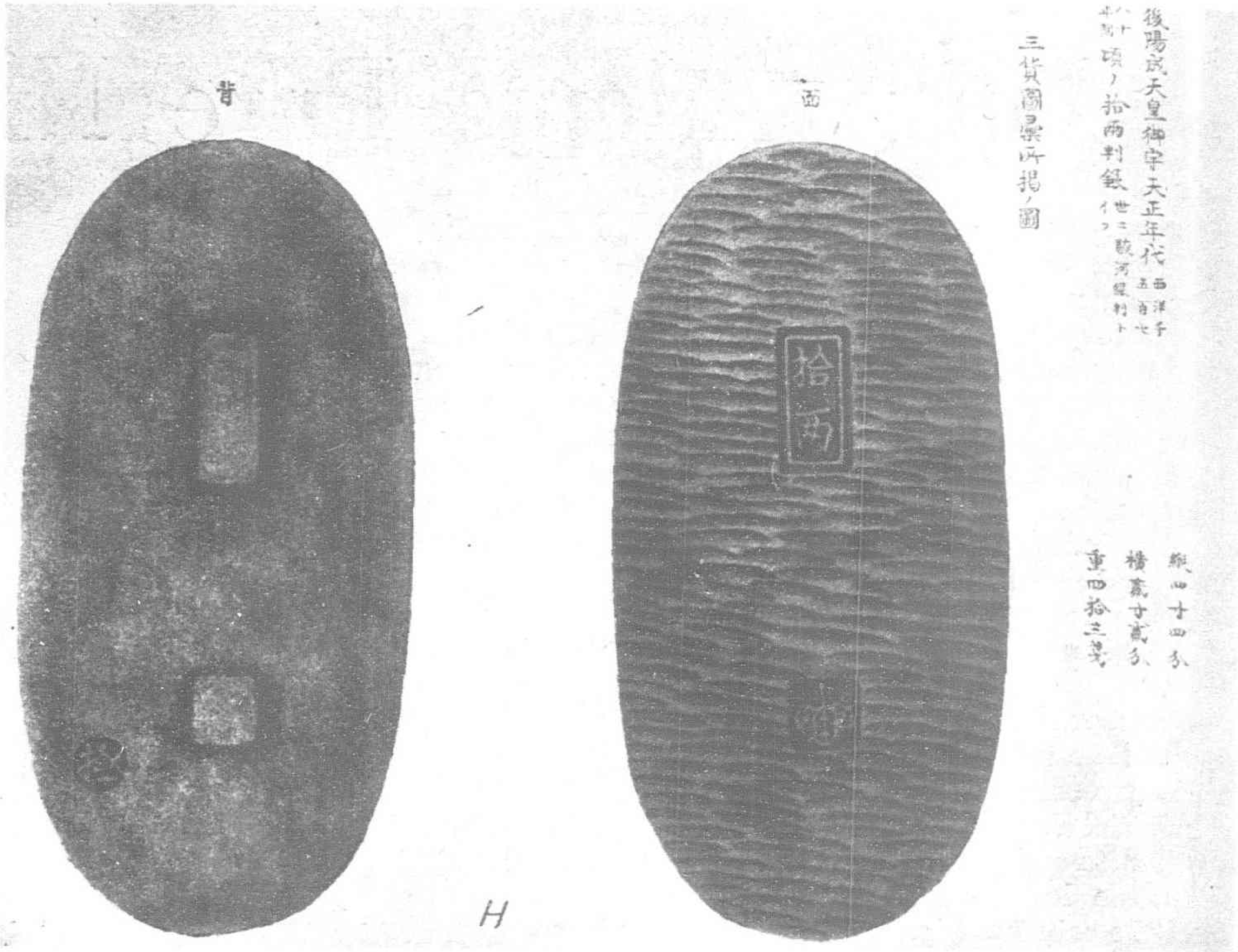
Gold or silver refined ..	81,950 gr.
Number of articles approved of their grade	312,875
Kinds of ore analyzed ..	4,109
Number of metals made ..	129,312

Production of coin

20 yen coin	136,190 thousands yen
50 sen ,, ...	15,000 ,, ,,
10 ,, ,, ...	1,500 ,, ,,
5 ,, ,, ...	200 ,, ,,
1 ,, ,, ...	250 ,, ,,

(Employees: Staff, 160; Workmen, 380.)

The first nickel coins in Japan were the new five sen coins, as per Fig. 1, composed of 25% of


後陽成天皇御宇天正年代（西洋千五百七十八年頃）ノ拾両判銀（世ニ駿河墨判ト云フ）
三貨圖彙所掲ノ圖
背
面
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横貳寸貳分
重四拾三匁
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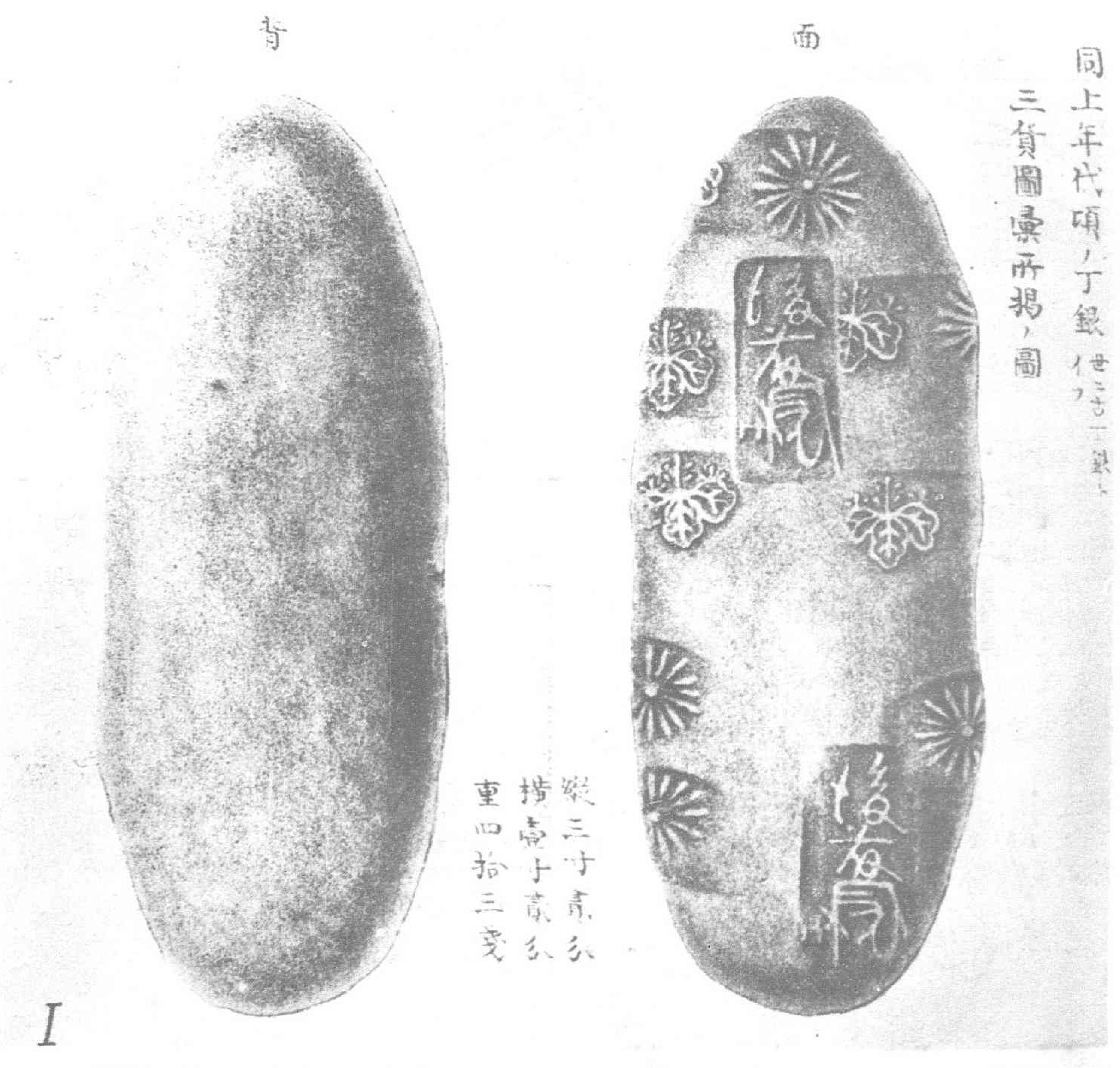
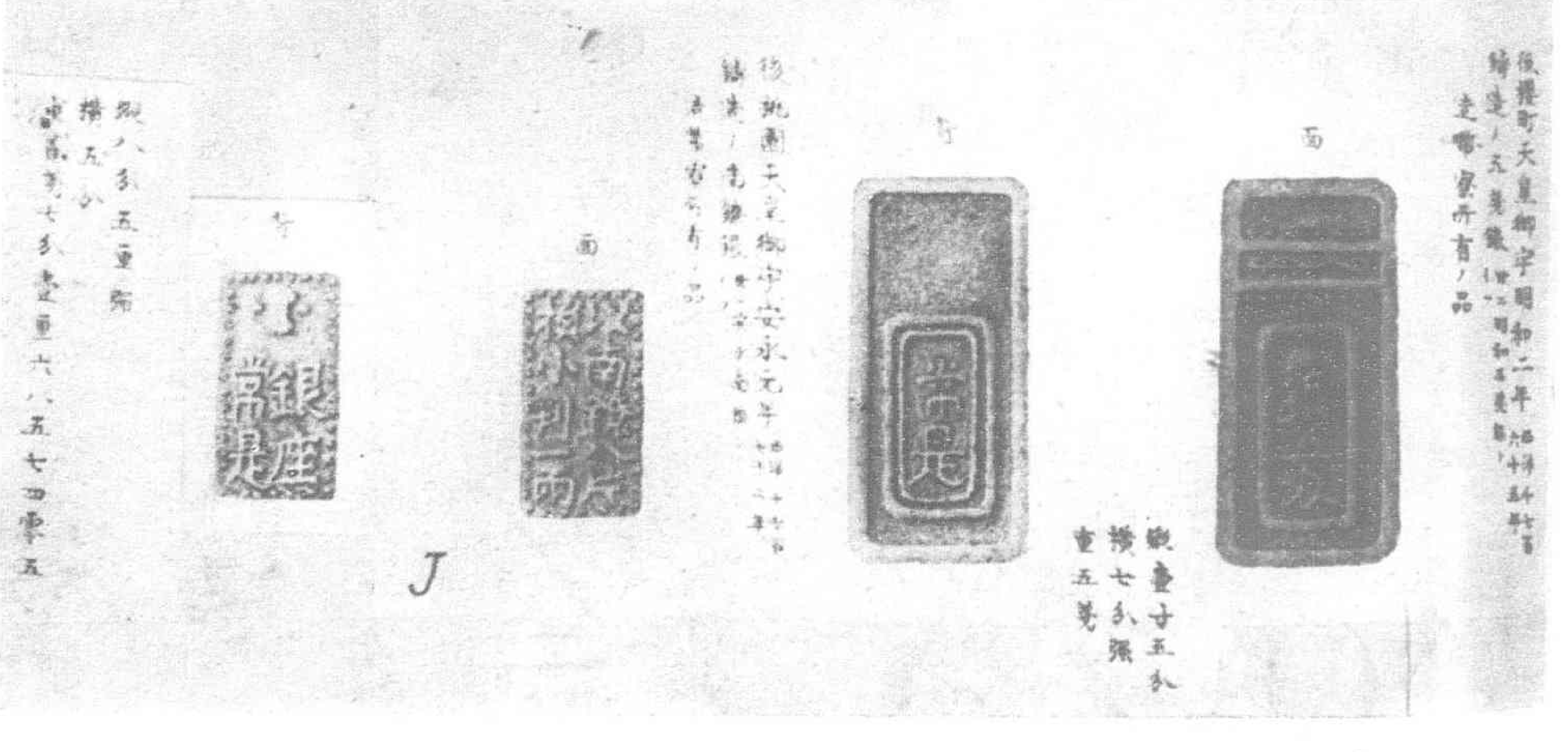
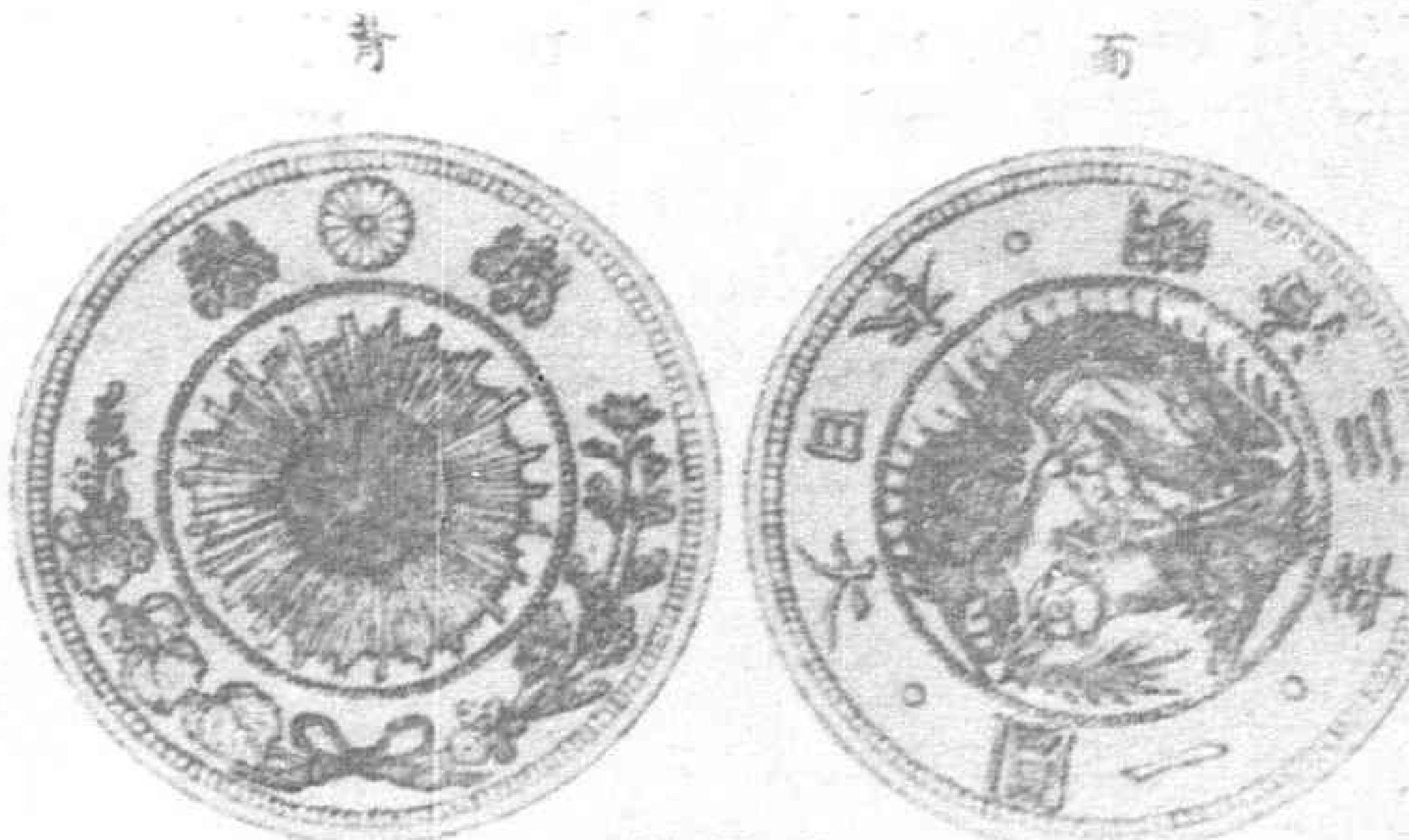


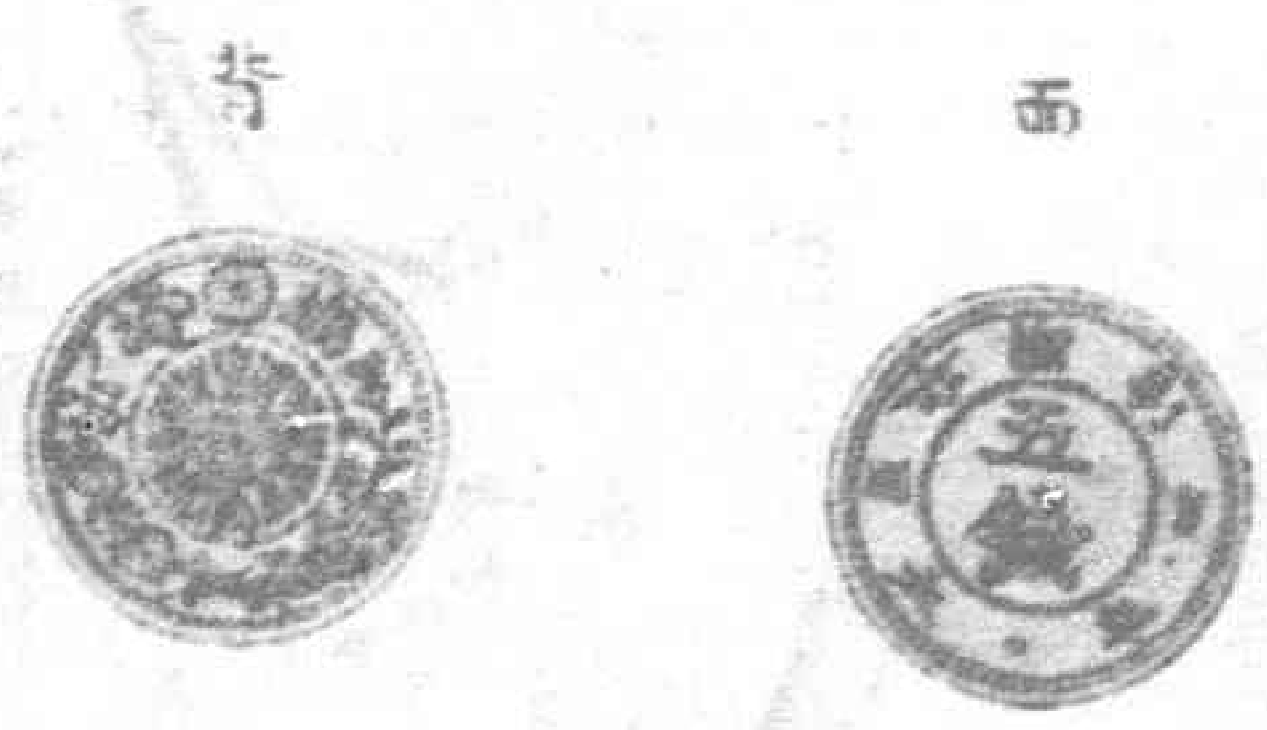


今上明治四年（西洋千八百七十一年）發行ノ壹圓貿易銀、
此銀貨ハ明治七年圖画改正同八年
増量圖画改正即チ後ニ載ス



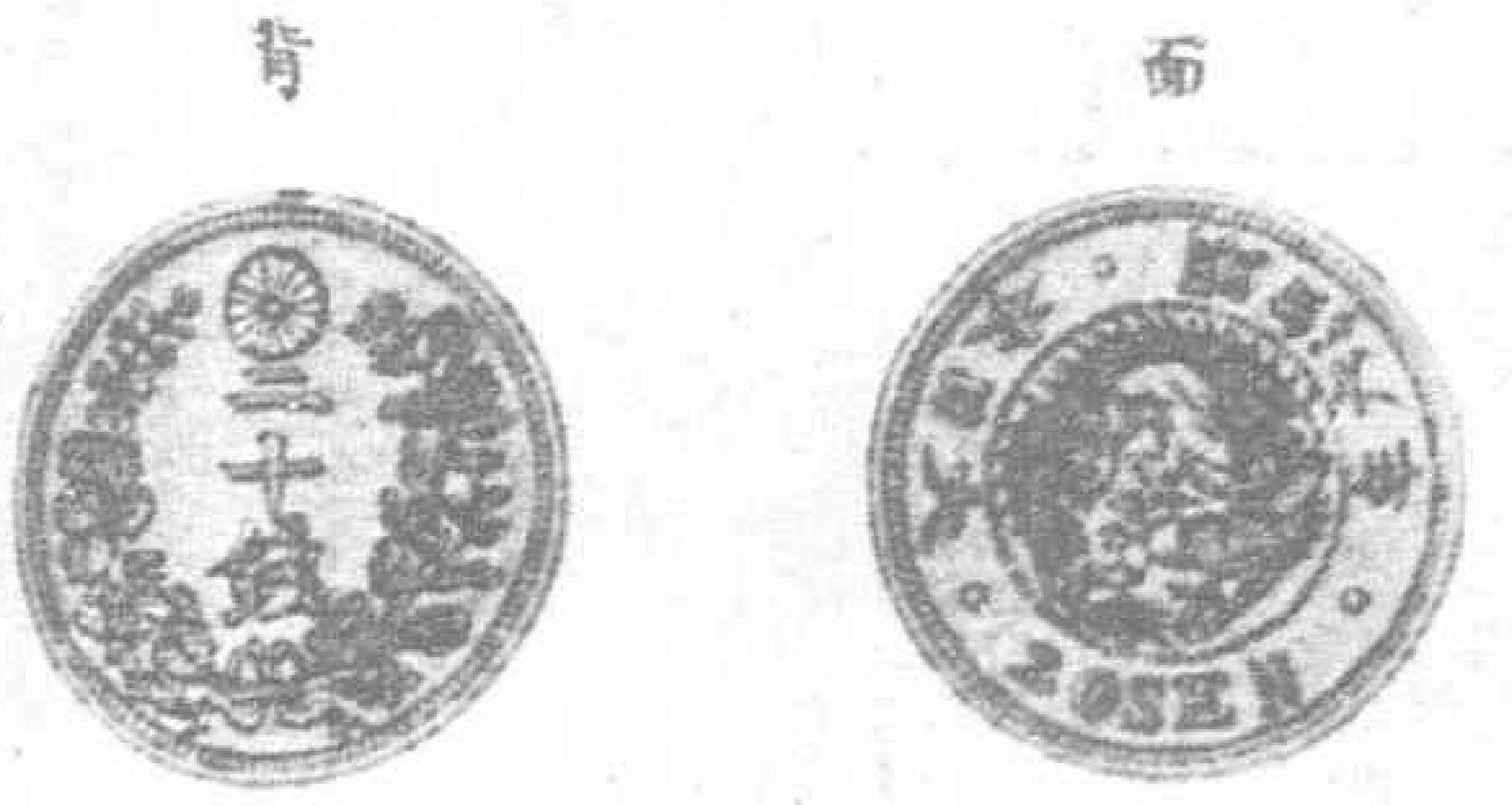
徑（尺曲）壹寸壹分四厘
量目（日本七匁一分七厘六毛 英國四百十六ゲレイン二）
性合 銀九銅一

今上明治五年（西洋千八百七十二年）表面共
外緣改正補助五錢銀貨



徑（尺曲）五分
量目（日本三分三厘二毛九二五 英國十七ゲレイン一三）
性合 銀八銅二

今上明治六年（西洋千八百七十三年）
圖画改正補助貳拾錢銀貨、（但量目寸法改正ハ明治五年ニ係ル）

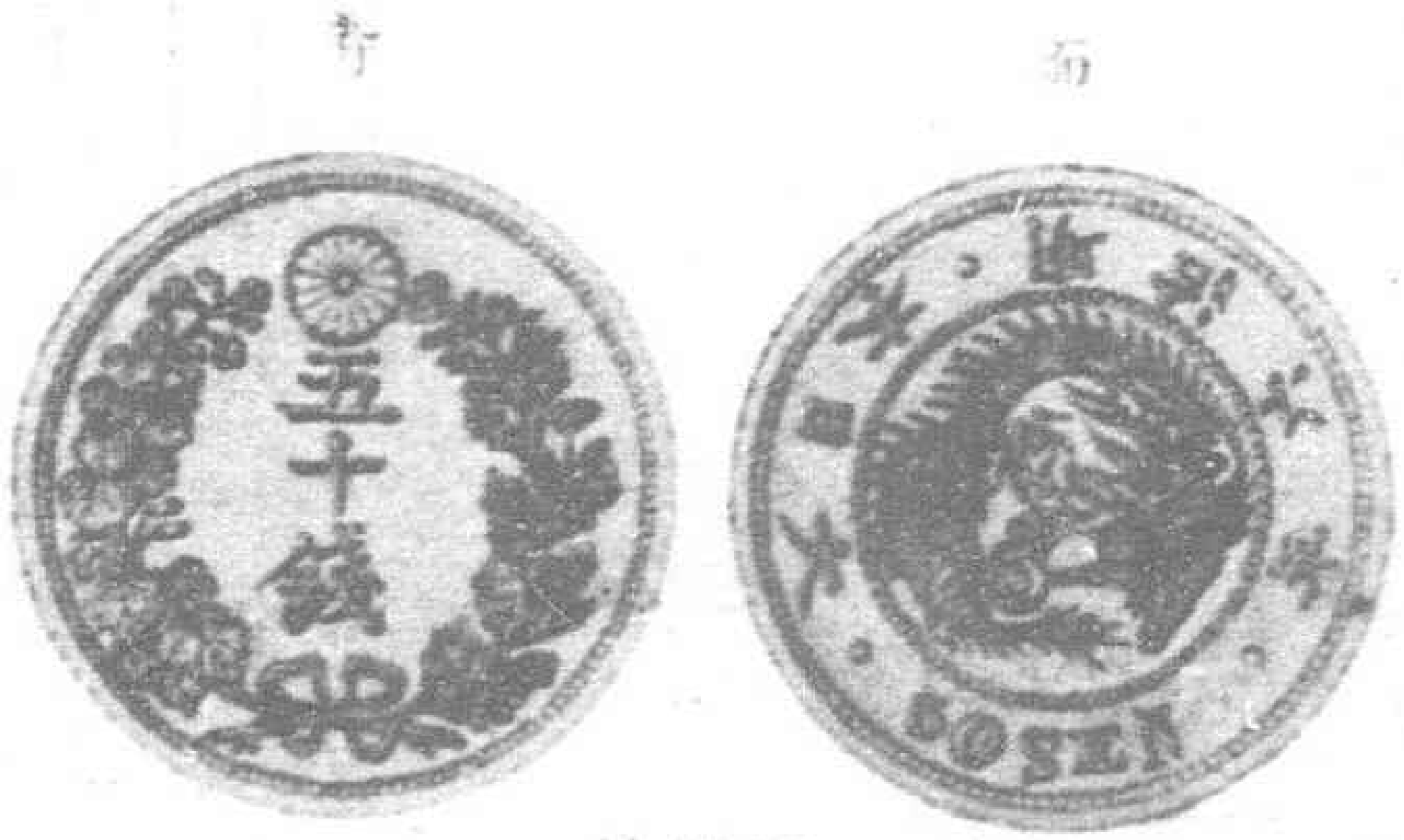


徑（尺曲）七分四厘
量目（日本一匁四分三厘五毛二 英國八十三ゲレイン二二）
性合 銀八銅二

今上明治五年（西洋千八百七十二年）表面改正
發行同年寸法改正未ダ壹圓金貨

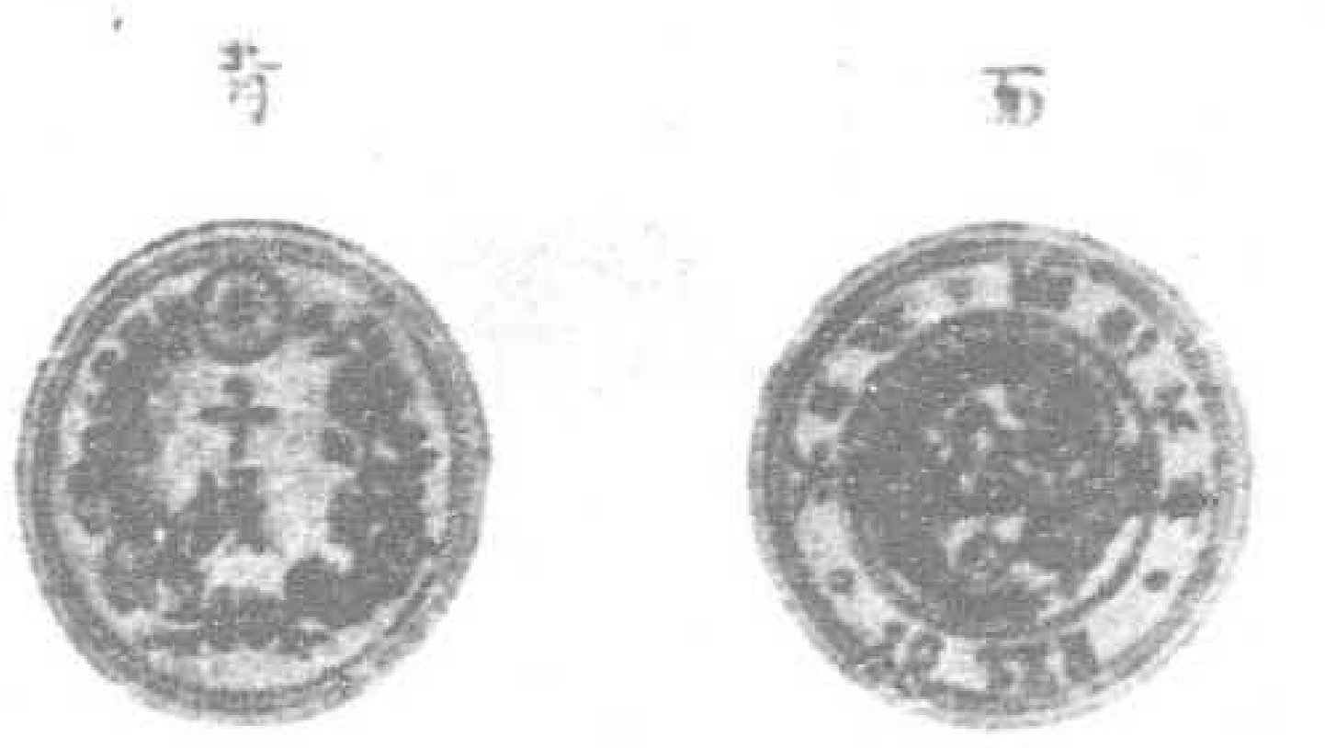
徑（尺曲）四分
量目（日本四分四厘三毛六七 英國二十五ゲレイン七二）
性合 金九銅一

今上明治六年（西洋千八百七十三年）圖画改正補助五拾錢銀貨、（但量目寸法改正ハ明治五年ニ係ル）



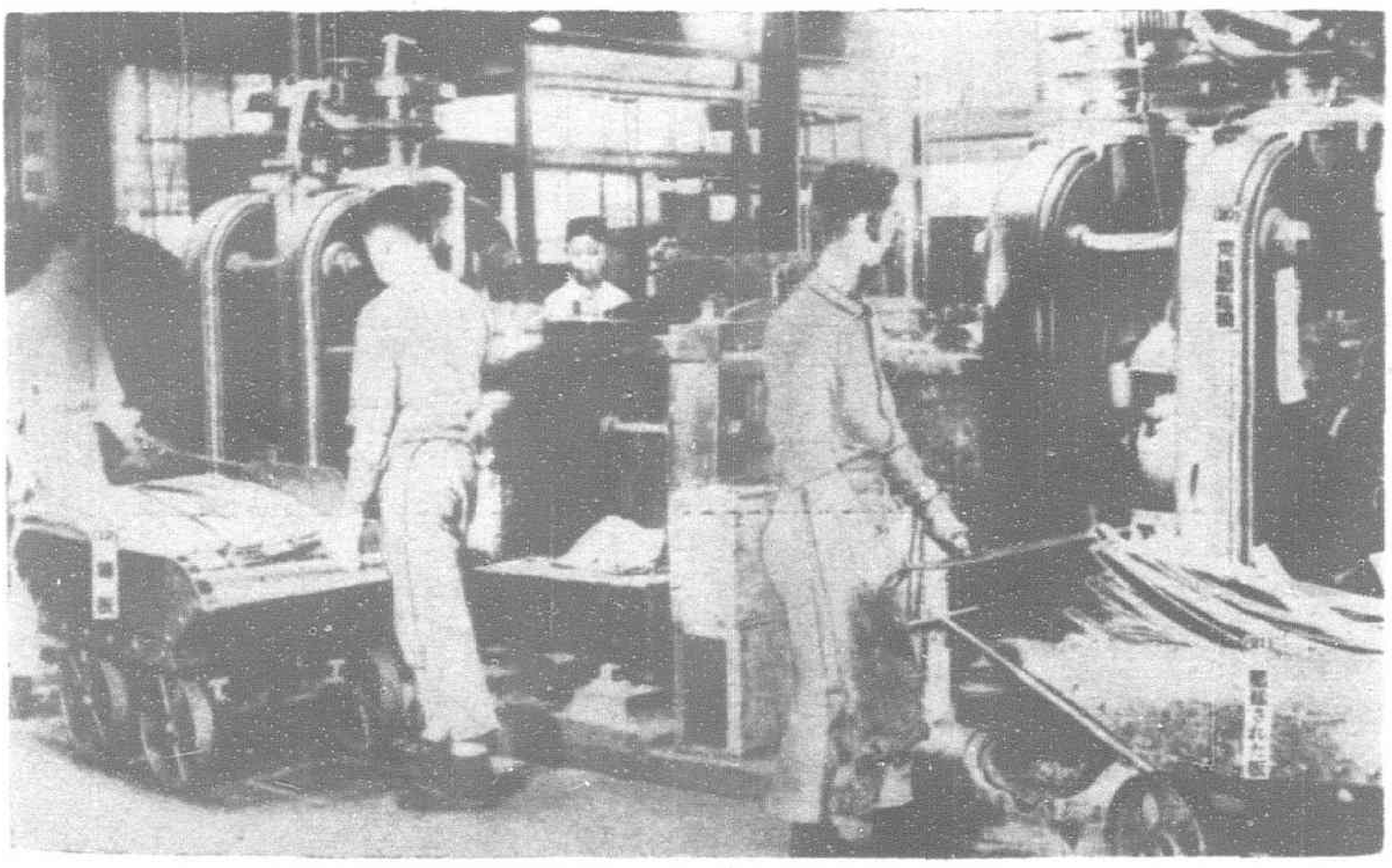
徑（尺曲）壹寸[illegible]
量目（日本三匁五分八厘八毛 英國二百八ゲレイン[illegible]）
性合 銀八銅二

同上圖画改正補助拾錢銀貨（但量目寸法改正ハ明治五年ニ係ル）

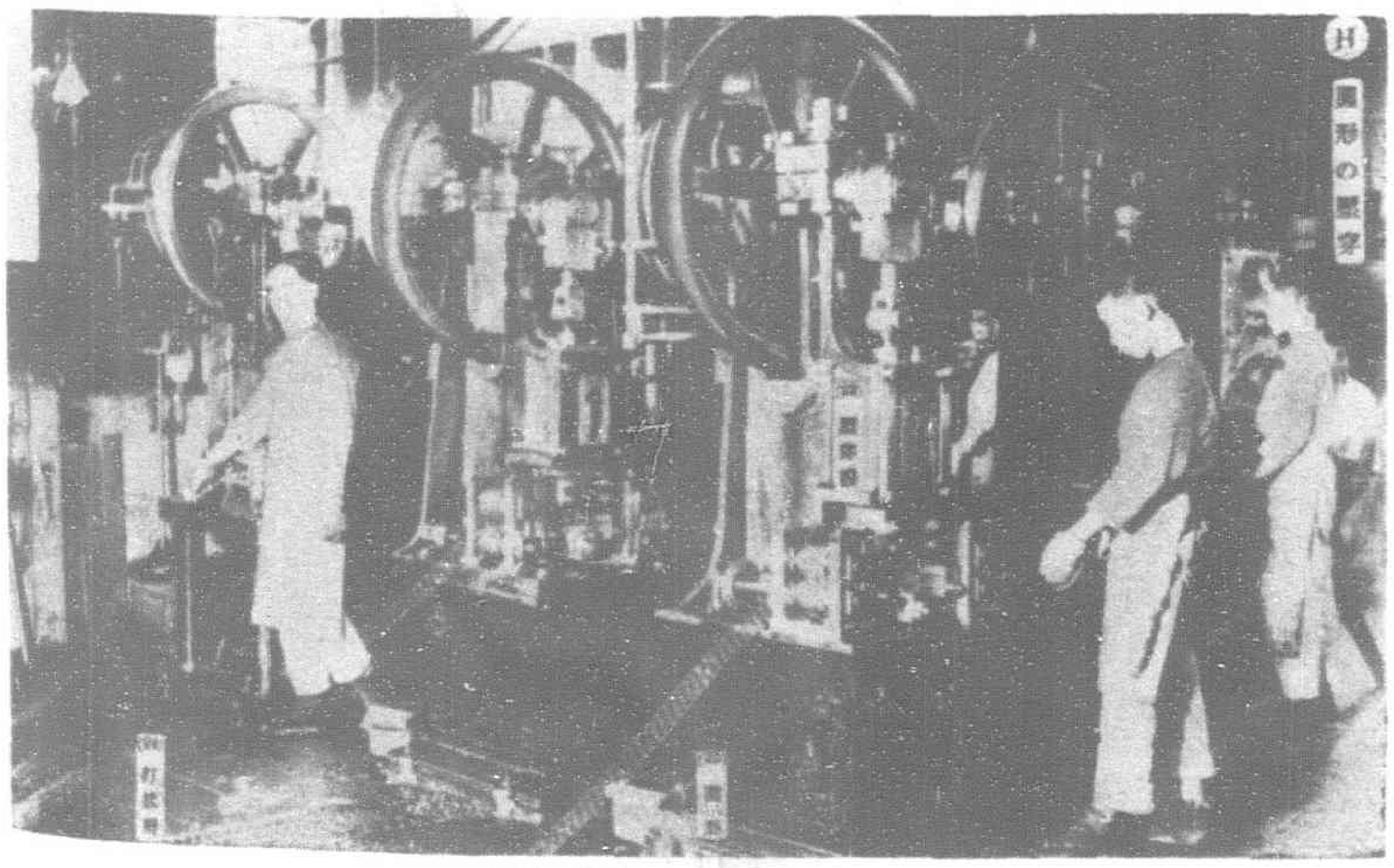


徑（尺曲）五分八厘
量目（日本七分一厘七毛六 英國四十一ゲレイン六）
性合 銀八銅二

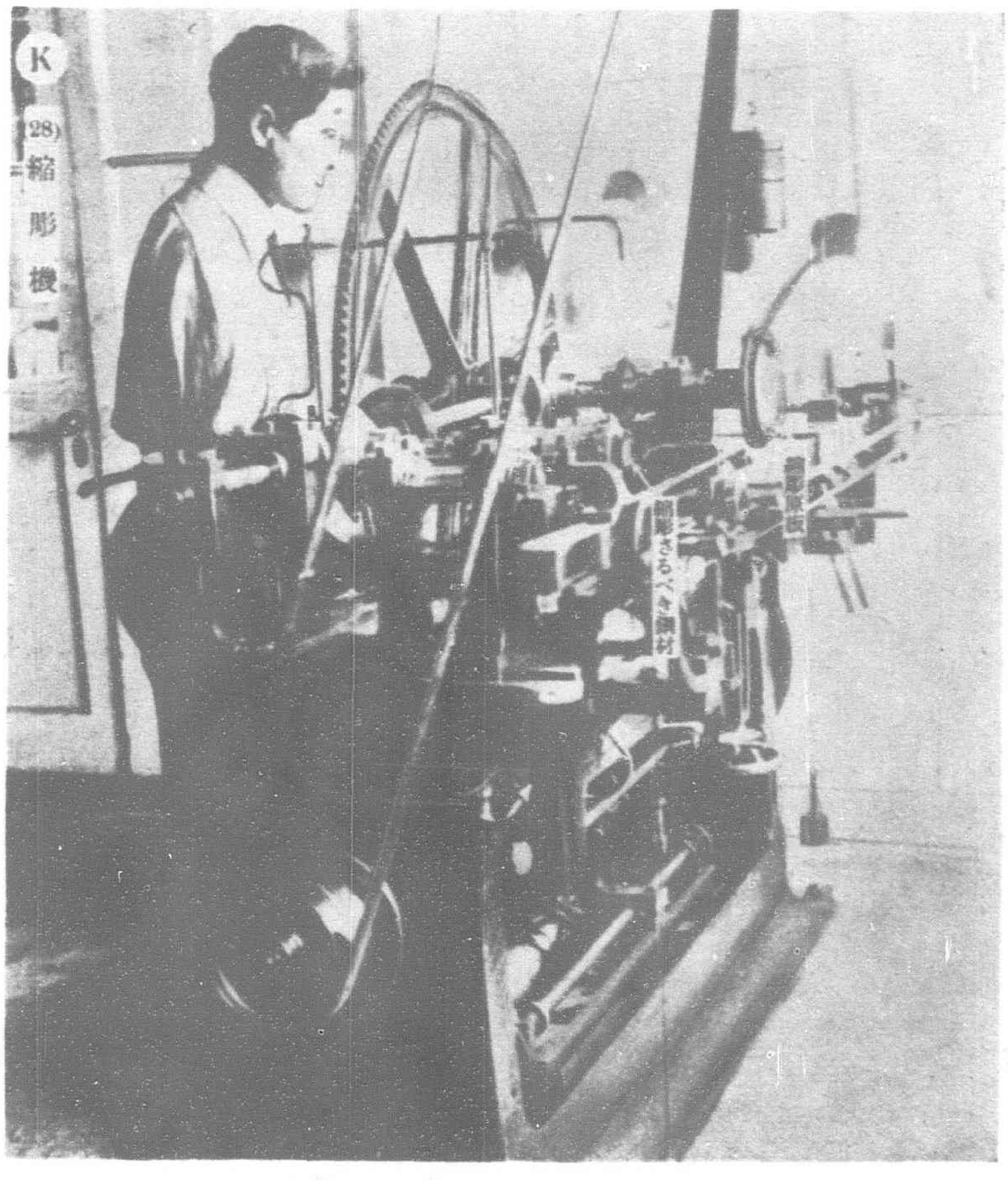
K



Rolling Ingots to Sheets



Blanking Presses



Coin Finishing Machine

nickel and 75% of copper, minted from April 1, 1889. The diameter of these coins was 20.4 mm. and their weight 4.66 grammes. These coins were put into circulation one month after being minted.

As a result of the revision of the coinage law on March 26, 1897, the patterns of the nickel coins were changed as per Fig. 2. The size and weight were left unchanged. They were issued from October 1, 1897.

Under Imperial Ordinance No. 35, of March 30, 1916, a center hole 4.2 mm. was specified for the nickel coins, as per Fig. 3. The diameter of the coin remained unchanged. The weight was 4.275 grammes. This change was put into effect on April 1, 1916.

The ten sen nickel coins were authorized by the Imperial ordinance of August 26, 1920, and at the same time the five sen nickel coinage was revised.

Ten sen Nickel (Fig. 4)

Diameter	21.9 mm.
Diameter of hole	4.5 mm.
Weight	3.75 gr.

Composition :

Copper	75%
Nickel	25%

Five sen Nickel (Fig. 5)

Diameter	18.9 mm.
Diameter of hole	2.9 mm.
Weight	2,625 gr.

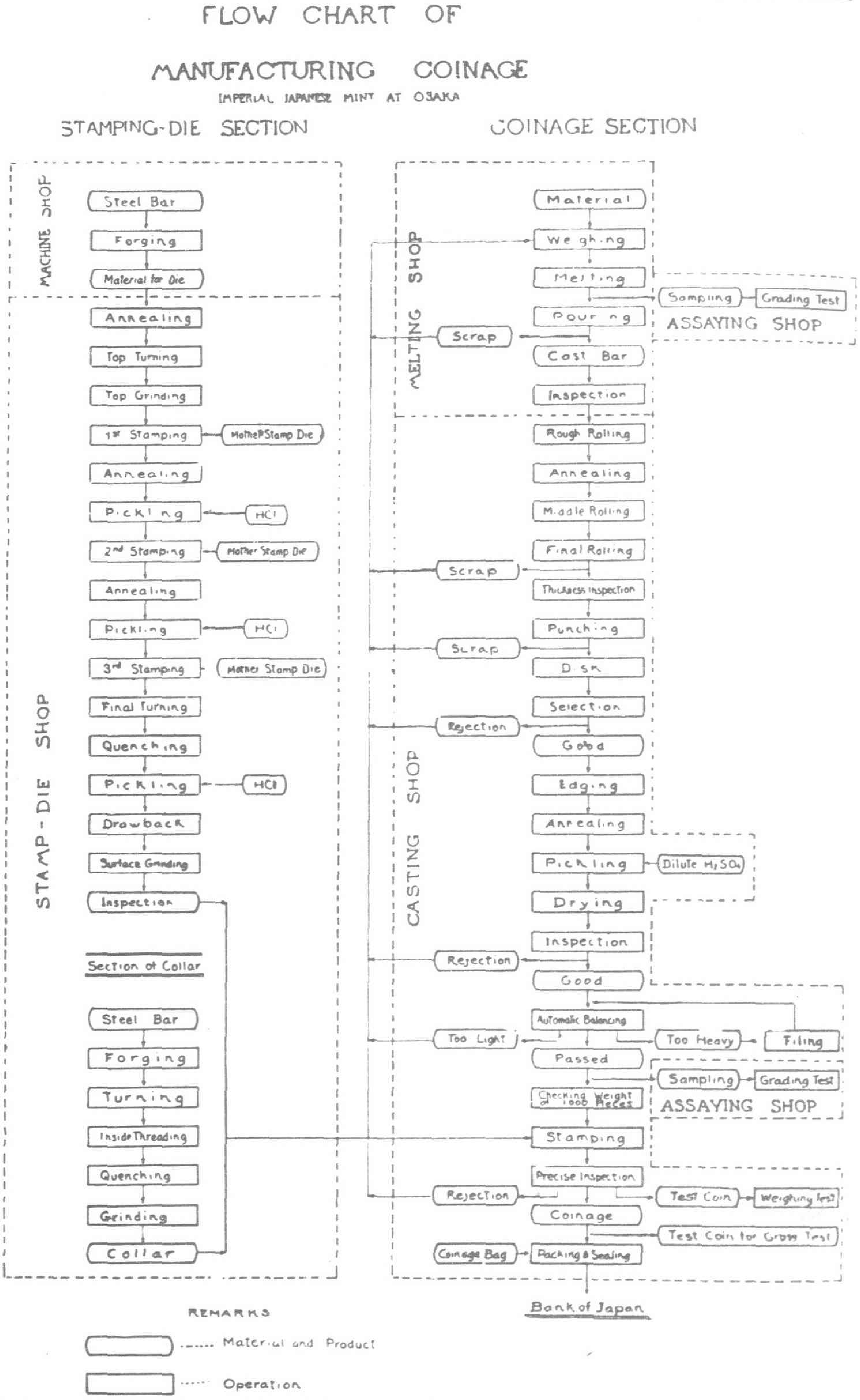
Composition .. same as for the ten sen coin

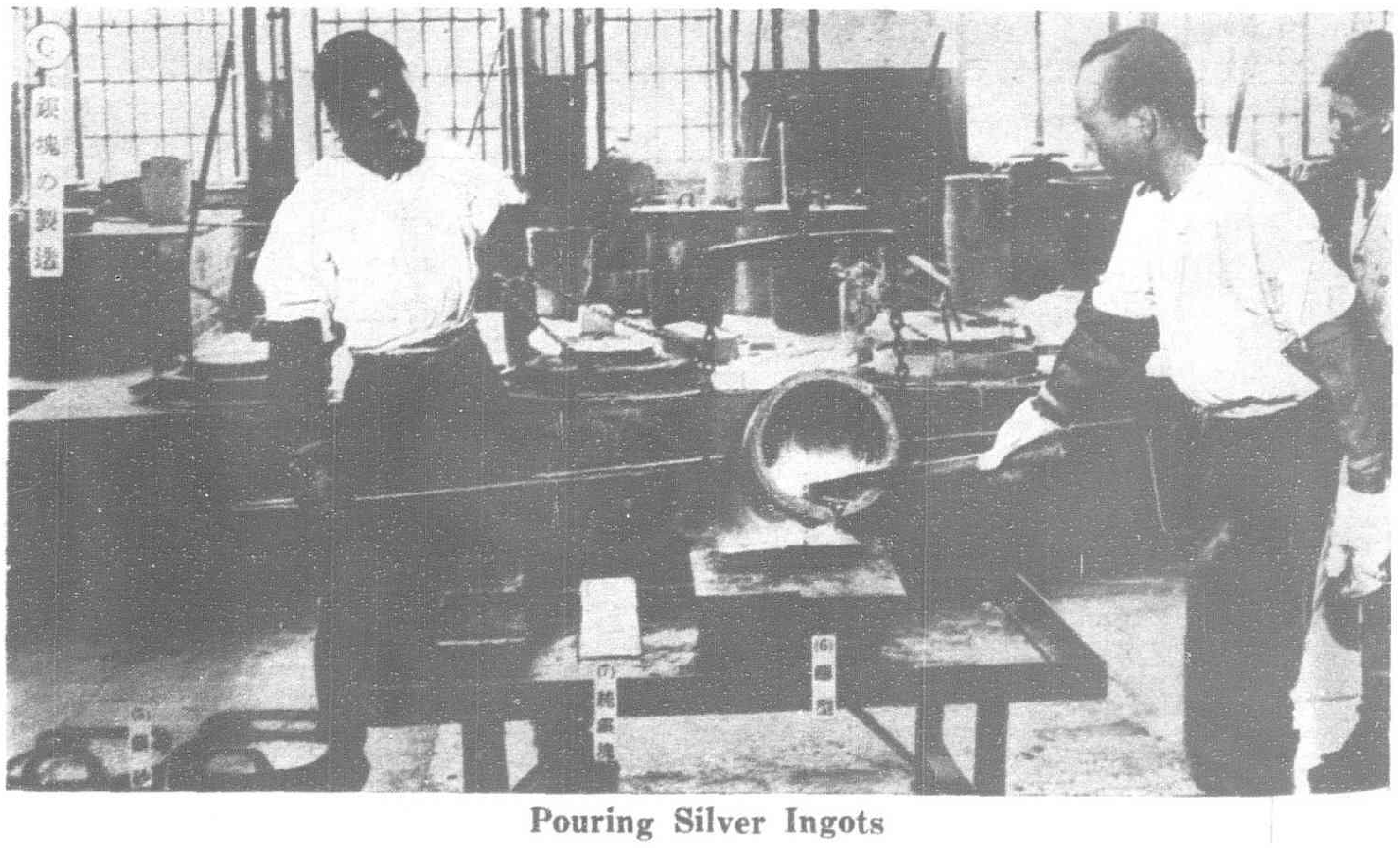
Since the beginning (in 1889) of the production of alloy five and ten sen pieces, there has been produced a total in ten sen pieces of Y.59,756,072.30, in five sen pieces a total of Y.36,028,858.65, or a grand total of Y.95,784,930.95, from 1889 to 1931.

The alloy coins are now to be replaced, by August, 1933, with pure nickel coins of the design as already shown. The ten sen coins will be 22 mm. in diameter with a hole of 6 mm. and a weight of 4 grammes; and the five sen coins will be 19 mm. in diameter with a hole of 4 mm. and a weight of 2.8 grammes. Thus Japan will come into line with other countries which have adopted pure nickel coins.

Pure Nickel Coins Adopted by Various Countries

Country	*Date put into Circulation*	*Designation of Coin*	*Type*	*Weight (grammes)*	*Diameter (m/m)*
Albania	1926	¼ lek	plain	4.00	21.50
,,	1926	½ lek	,,	6.00	24.00
,,	1926	1 lek	,,	8.00	27.00
Germany	1910	25 pfennig ..	,,	4.00	23.00
,,	1927	50 pfennig ..	,,	3.50	20.00
Angola	1922	50 centavos ..	,,	10.64	31.00
Danish Antilles	1905	5 cents ..	,,	4.00	21.00
Austria	1892	10 hellers ..	,,	3.00	19.00
,,	1892	20 hellers ..	,,	4.00	21.00
Belgium	1923	50 centimes ..	,,	2.50	18.00
,,	1922	1 franc ..	,,	5.00	23.00
,,	1923	2 francs.. ..	,,	10.00	27.00
,,	1930	5 francs.. ..	,,	14.00	31.00
,,	1930	10 francs ..	,,	17.50	34.00
,,	1931	20 francs ..	,,	20.00	37.00
Canada	1922	5 cents	,,	4.53	21.00
Straits Settlements	1920	5 cents	,,	4.00	20.00
Ecuador	1928	2½ centavos ..	,,	2.50	18.29
,,	1928	5 centavos ..	,,	3.00	19.33
,,	1928	10 centavos ..	,,	4.00	21.34





Pouring Silver Ingots

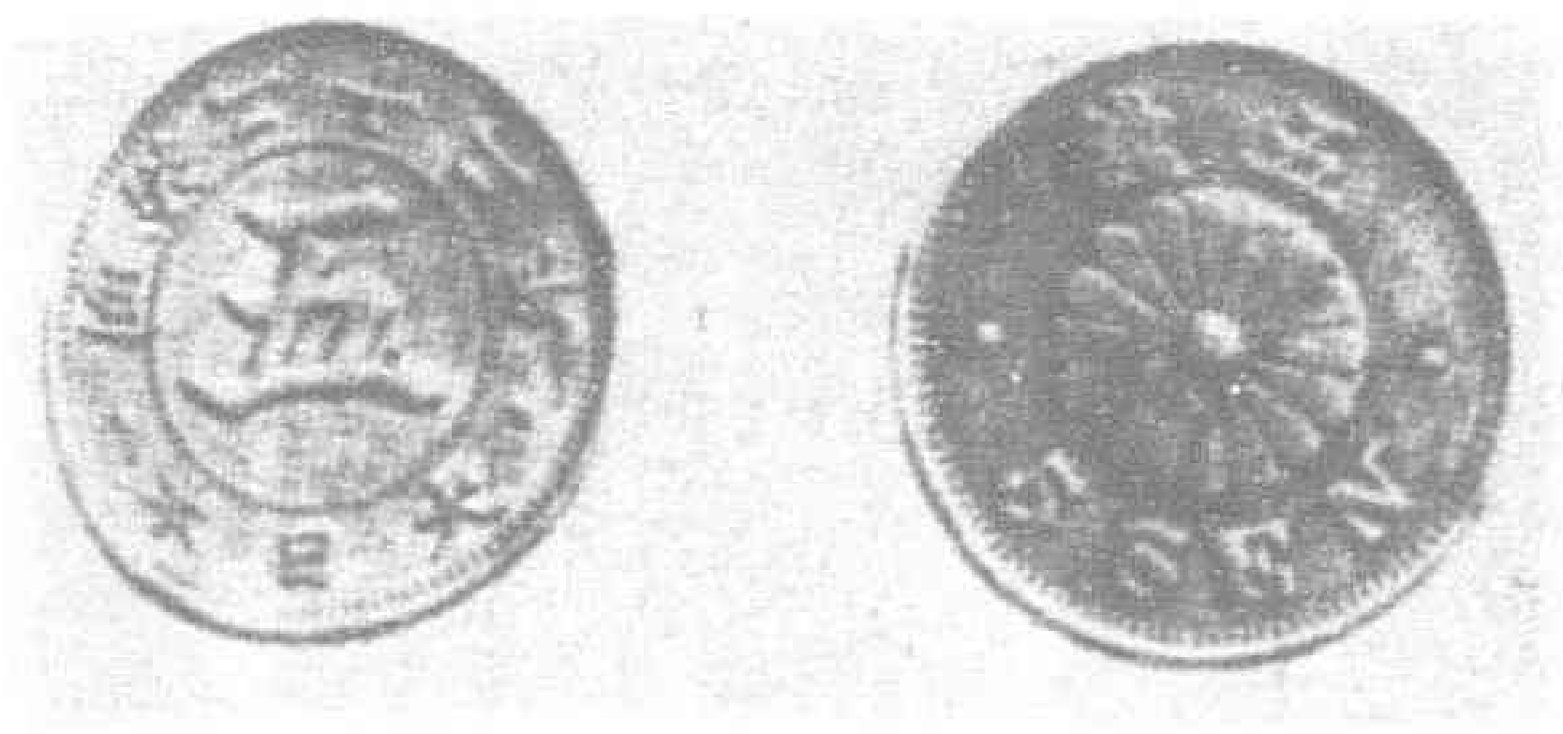


Fig. 1 (第一圖)

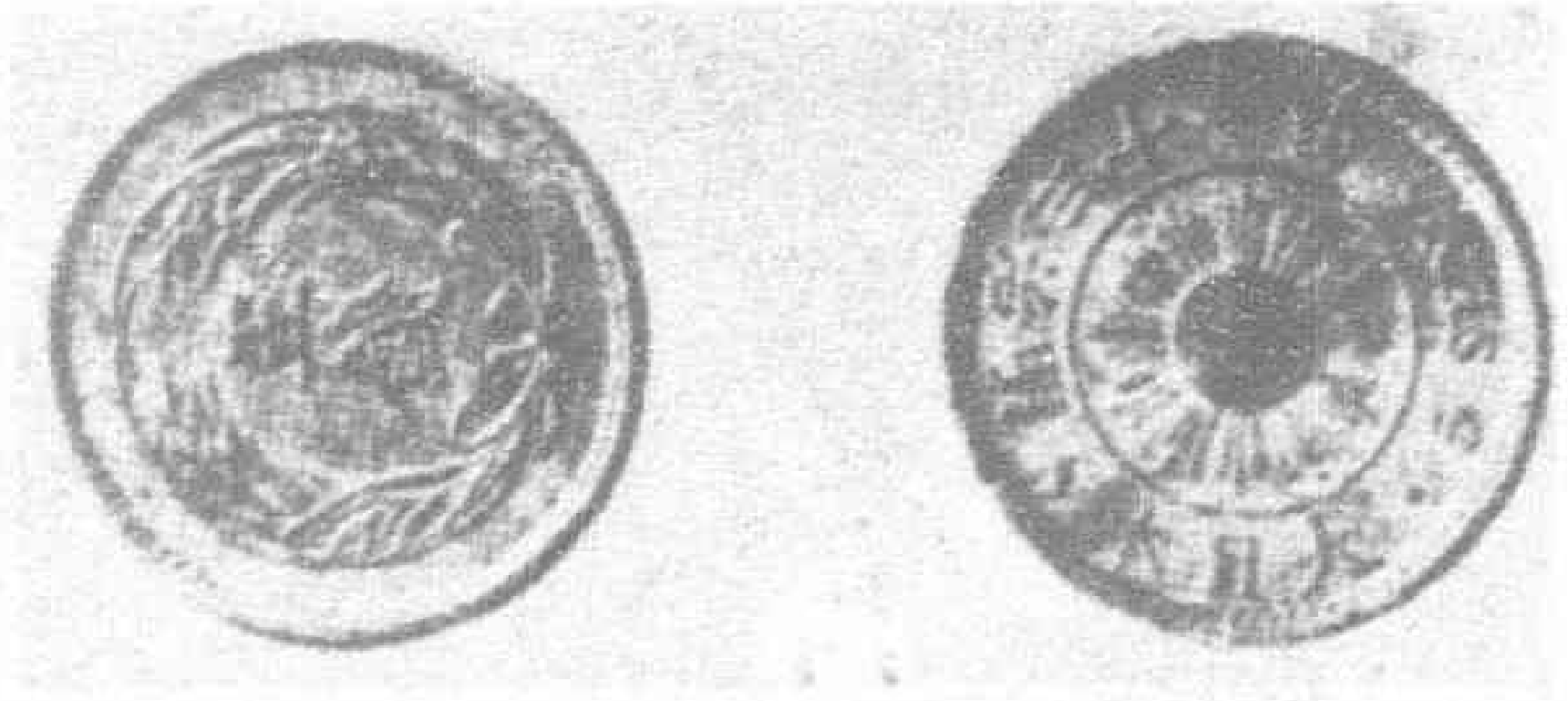


Fig. 2 (第二圖)

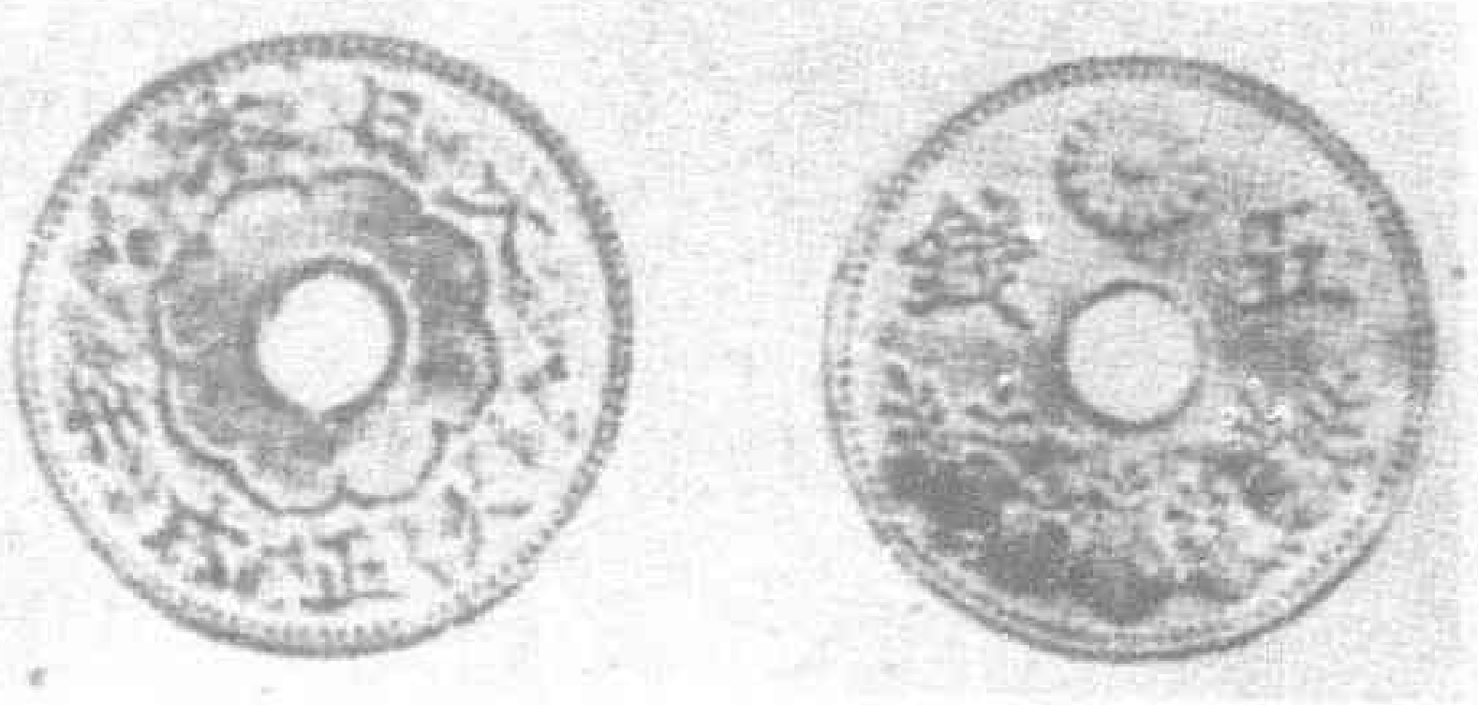


Fig. 3 (第三圖)

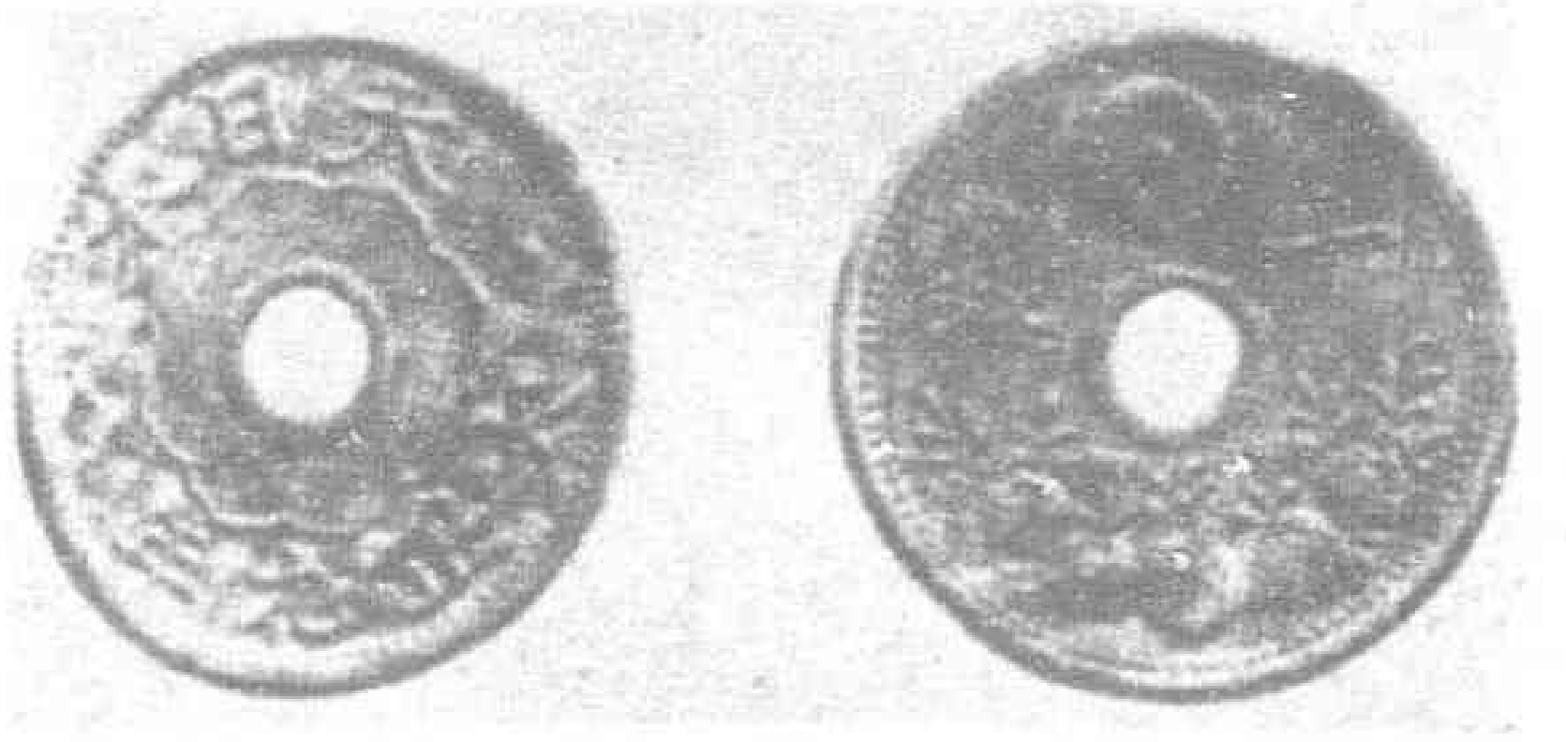


Fig. 4 (第四圖)

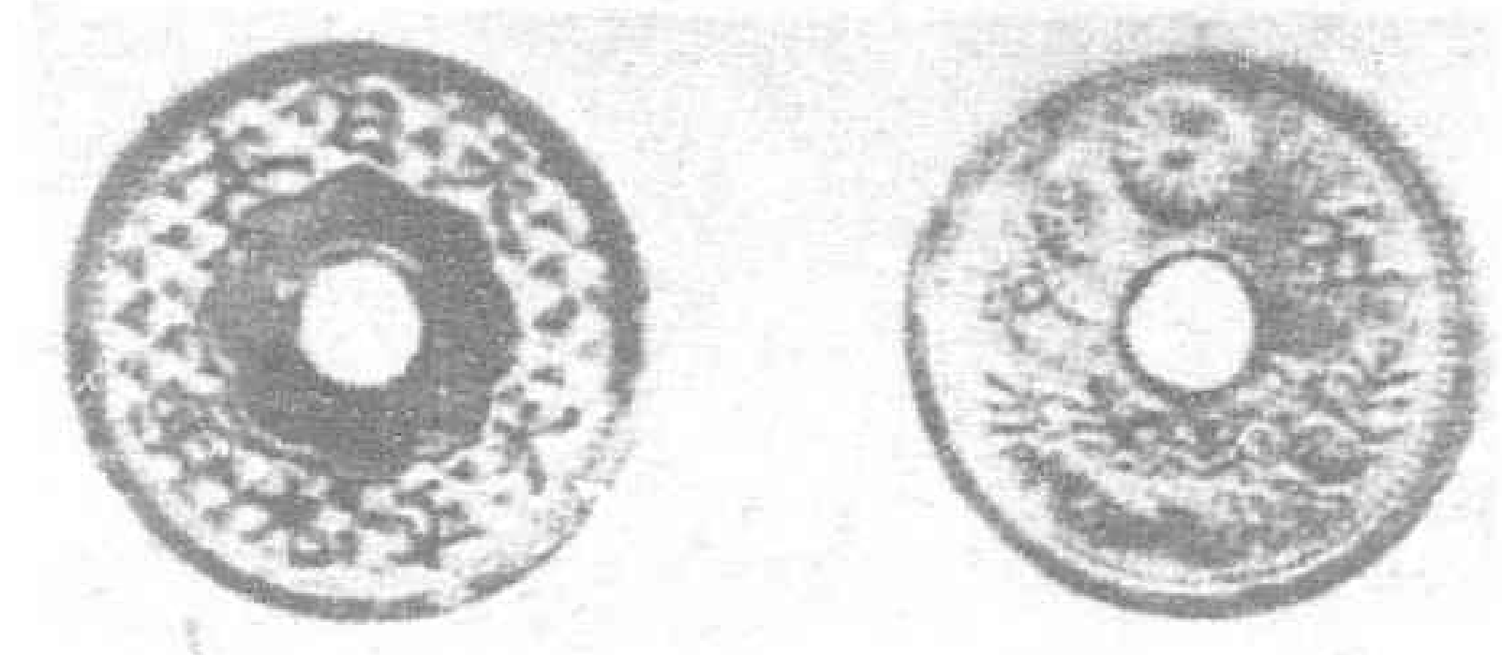


Fig. 5 (第五圖)

Country	*Date put into Circulation*	*Designation of Coin*	*Type*	*Weight (grammes)*	*Diameter (m/m)*
France	1914	10 centimes	pierced, with a hole in the center	4.00	21.00
,,	1903	25 centimes	plain	7.00	24.00
,,	1905	25 centimes	with a milled edge	7.00	24.00
,,	1914	25 centimes	pierced, with a hole in the center	5.00	24.00
Greece	1913	5 lepta	,,	3.00	19.00
,,	1913	10 lepta	,,	4.00	21.00
,,	1913	20 lepta	,,	5.00	23.00
,,	1930	5 drachmes	plain	10.00	29.00
Hungary	1892	10 heller	,,	3.00	19.00
,,	1892	20 heller	,,	4.00	21.00
Ireland	1928	Threepence	,,	3.24	17.65
,,	1928	Sixpence	,,	4.53	20.82
Italy	1908	20 centesimi	,,	4.00	21.50
,,	1902	25 centesimi	,,	4.00	21.50
,,	1920	50 centesimi	,,	6.00	24.00
,,	1922	1 lire	,,	8.00	26.50
,,	1923	2 lire	,,	10.00	29.00
Latvia	1922	10 santimu	,,	3.00	19.00
,,	1922	20 santimu	,,	4.00	21.00
,,	1922	50 santimu	,,	6.50	25.00
Luxemburg	1930	50 centimes	,,	2.50	18.00
,,	1924	1 franc	,,	5.00	23.00
,,	1924	2 francs	,,	10.00	27.00

Nanking's Big Steel Plant

The Nanking Ministry of Industry is redoubling its efforts to put through the much discussed $20,000,000 (gold) steel-plant project. Despite the fact that many months ago the contract was signed, the project has made little headway, the chief obstacle being the question of security for the proposed gold $20,000,000 loan.

The Ministry finally approached the Trustees for Sino-British Boxer Fund, and the Board agreed to finance the project on condition that the revenues of the Government from the Mining Tax were used as security for the loan. In January of this year Dr. Huang Han-liang, Minister of Finance in the short-lived Sun Fo Government, approved the proposal. When the Sun Fo Government resigned, however, the scheme was rejected. Having exhausted every possibility of raising the gold $20,000,000, or finding security, the Ministry of Industry started negotiations with the Kondorfer interests for a reduction of capital from gold $20,000,000 (approximately $80,000,000 Mex.) to $40,000,000 Mex., and as to security, the Ministry suggested the Luai Chia Kou Coal Mines, the loan to be raised by the German interests.

The Luai Chia Kou Coal Mines, according to estimates by experts, has a capacity of 2,000,000,000 tons. Representatives of the German interests arrived in Shanghai on September 12 to start negotiations, and, according to reports, these are proceeding satisfactorily.

"The Japan Nickel Review"

A wholly noteworthy new technical publication which made its appearance in April is the *Japan Nickel Review*, published at Tokyo by the Japan Nickel Information Bureau under direction of Mr. James A. Rabbitt, Adviser and Acting Director. The new publication is bi-lingual, in Japanese and English, in regular magazine size and form and attains a high degree of typographical excellence.

Outstanding articles in the initial number include: "Onward Scientific Japan!" by Dr. Bunji Mano, Member the House of Peers, Professor Emeritus, Tokyo and Kyushu Imperial Universities; "Nickel Research in France" by Dr. Leon Guillet, Member, the French Academy of Sciences, Director, the Ecole Centrale des Arts and Manufactures, Paris; "My Impression of the Development of Scientific Research in the Nickel Industry in America" by Dr. Masao Kamo, Professor, Tokyo Imperial University and President, the Japan Society of Mechanical Engineers; "Bullet Resisting Alloys" by Dr. Kotaro Honda, President, Tohoku Imperial University; "History of Nickel Coinage in Japan" by Dr. K. Komatsubara, Metallurgical Engineer, Imperial Japanese Mint, and "Study of Alloy Chilled Iron Rolls" by Kohei Taniguchi, Metallurgical Engineer, Imperial Steel Works, Yawata.

The Japan Nickel Information Bureau, which sponsors the new publication, is a Japanese headquarters for the collection and dissemination of important scientific and technical data relating to nickel, its products and their application to industry. A policy of co-operation in the scientific and technological aspects of industry, which has proved helpful in Europe has been expanded through the agency of the Japan Nickel Information Bureau to include the leading industrial nation of the Orient and the organization in Tokyo has joined the group of bureaux which are serving the higher standards and more exacting requirements of modern industry the world over. This group includes the Nickel Information Bureau of London, the Centres d'Information du Nickel of Paris and Brussels, the Nickel-Information-buro of Frankfort-am-Main, the Centro d'Informazioni del Nickel of Milan, and the Development and Research Department of the International Nickel Company in New York.

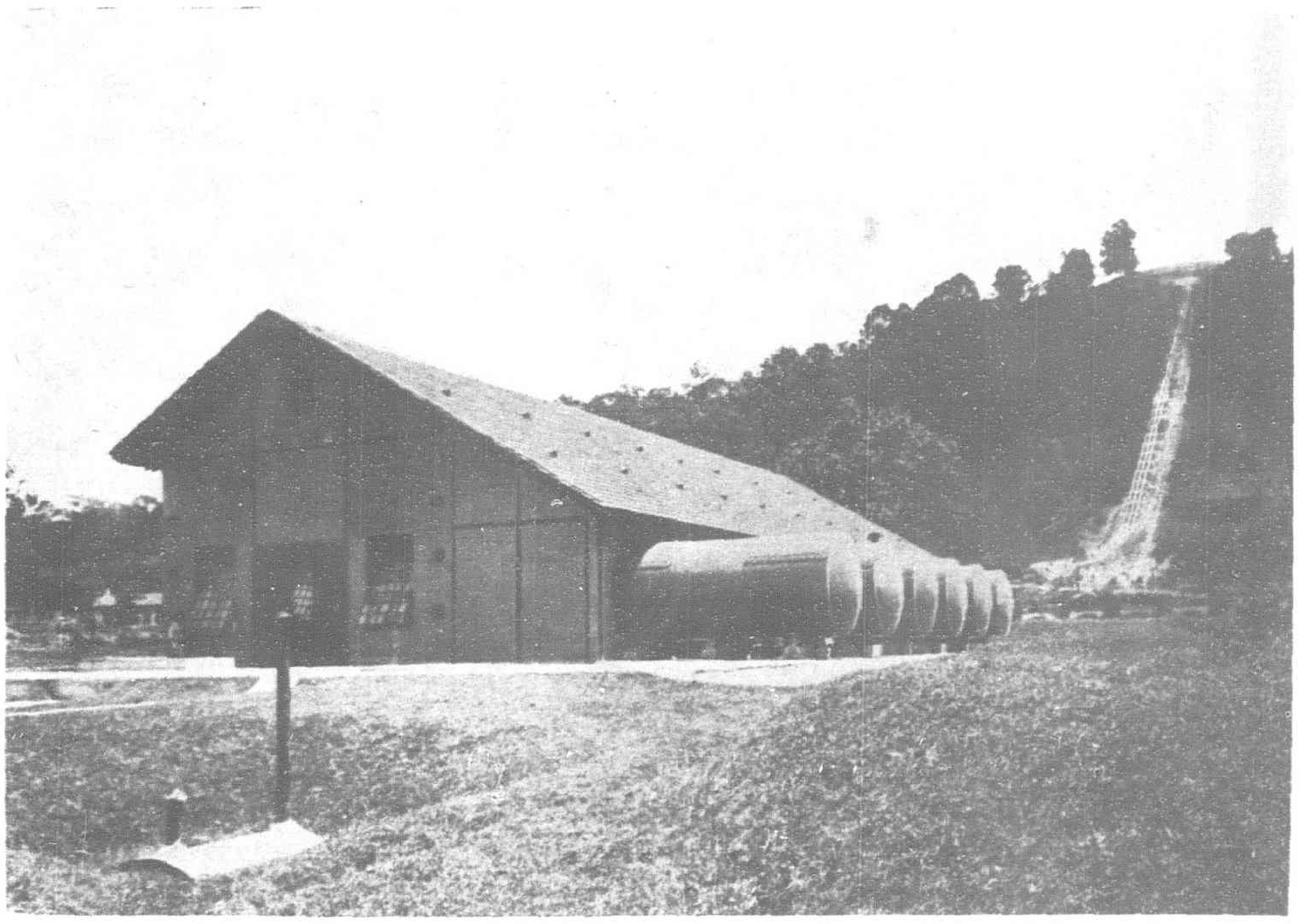
The Gold Industry of the U.S.S.R.

(Continued from page 168)

A. Serebrovsky, chairman of the United Non-Ferrous Metals and Gold Industries, who during 1931 and 1932 made a thorough personal investigation of all the important gold districts of the U.S.S.R., from the Urals to the Pacific Coast, reported that: "We have reserves which fully guarantee the further development of our gold industry—reserves not only of placer gold but chiefly of ore gold." He states that prospecting during the past year alone has considerably increased the known reserves of ore gold, and that the immense deposits of complex ores in the Altai Mountains (Kazakstan) are so rich in gold (30-80 grams per ton) that they should be regarded as primarily sources of gold rather than of non-ferrous metals. While in pre-war Russia ore or vein gold constituted only 15 per cent of total production, at present it constitutes about one-third, and Mr. Serebrovsky reported considerable development along this line in the various gold districts, particularly in the Urals, West Siberia, and the Yenisei River basin (East Siberia). However, in the Lena (East Siberia) and Aldan (Yakutia) gold-fields, which together have accounted for over 60 per cent of total Soviet gold production, ore mining had not yet been introduced. The development of ore mining in these fields, as well as those of the Far Eastern Region, constitutes one of the chief tasks of the gold industry during the period of the Second Five-Year Plan.

For the current year increases in output for the principal gold districts have been scheduled as follows: West Siberia—75 per cent; Transbaikal—81 per cent; Yenisei—21 per cent; Yakutia—43 per cent; Lena—157 per cent; Amur—39 per cent; and the Far Eastern—70 per cent.

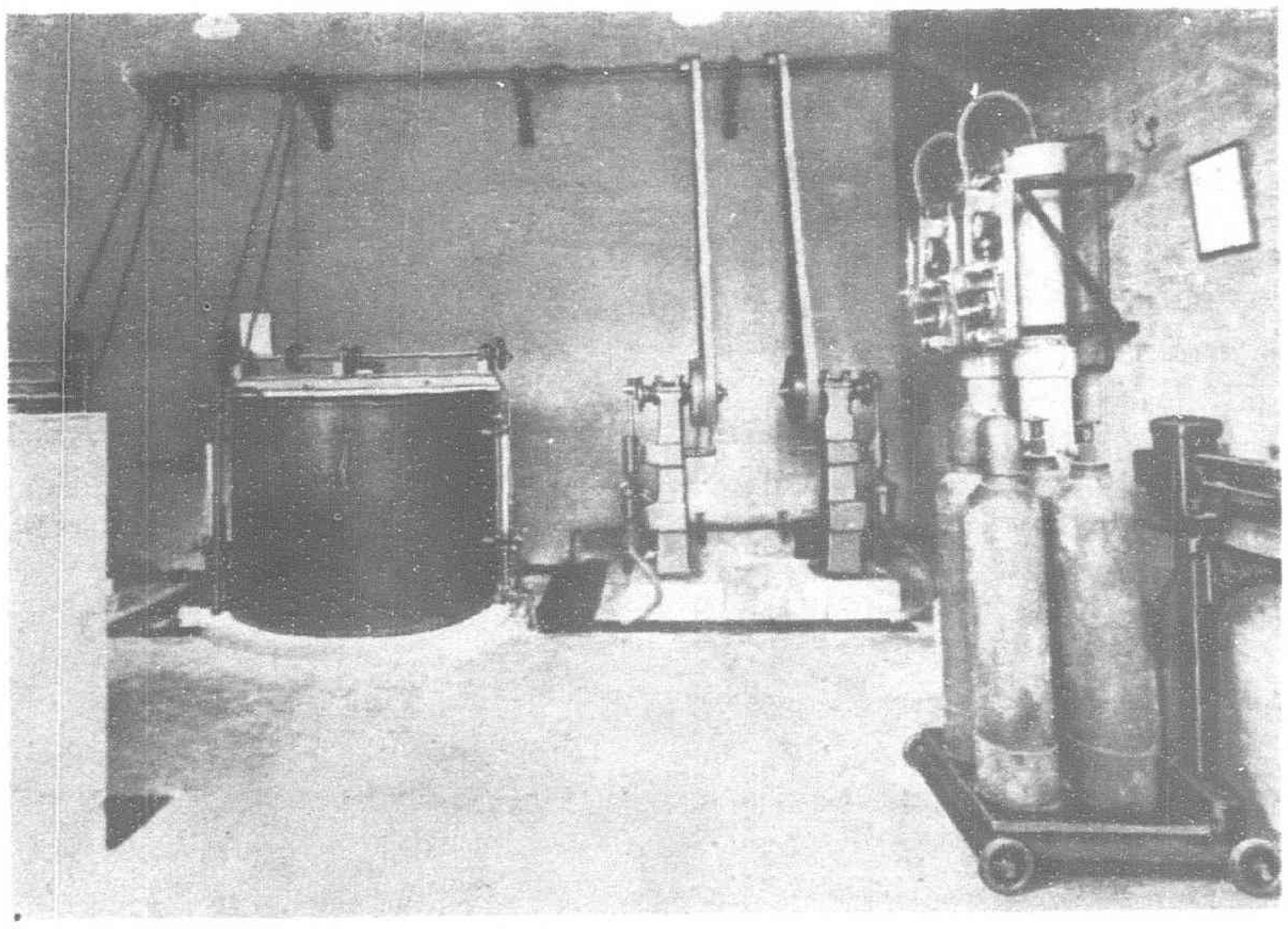
Notable Malaya Plant Supplying Pure Water From Polluted Source



Paterson Pressure Filtration Plant, Alor Star water supply, Malaya. Capacity 2,100,000 gallons daily

It is common knowledge that the rapidly growing demands in the world for towns water are necessitating more and more the use of sources of supply liable to considerable contamination, and for this reason great interest attaches to a water supply scheme that has been completed recently for the town of Alor Star in Malaya. This is the capital of Kedah State, being situated sixty miles north of Penang and also on the main air route to Java, so that it is likely to become an important center in the near future, the area being agricultural with rice and rubber as the chief products.

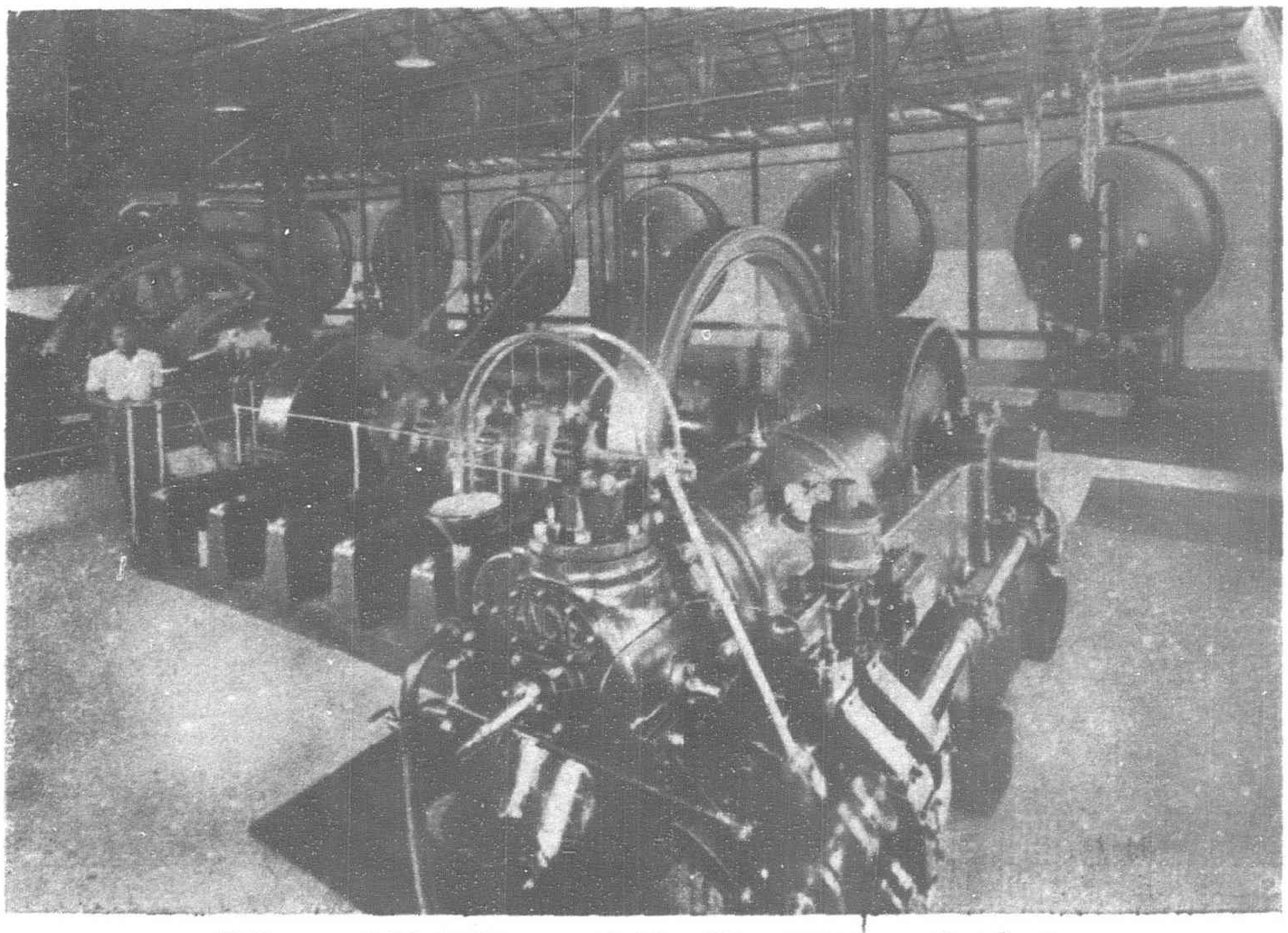
Essentially the scheme consists in pumping and purifying water from the Sungei Padang river, a highly polluted source, using a well connected to the river by gravity pipe and intake tower, the purified water being then delivered to a reservoir on the top of a hill known as the Bukit Pinang, at a distance of about 1,300 feet from the river. Also it may be stated that the normal flow of the latter is 12,000 cusecs (cubic feet per second), while the catchment area is 240 square miles and the approximate rainfall 90 inches per annum. From the reservoir the water is delivered through a two mile pipe line into the existing mains laid down in connection with a previous scheme, that is the Bukit Wang.



Liming Gear and Chloronome of Alor Star Filtration Plant

The pumping of the raw water is carried out by means of two 115 h.p. "Tangye" oil engines, driving through gearing two 3-throw "Tangye" pumps, each of which is able to deliver 44,000 gallons of water per hour against a head of 300 feet. Normal requirements are 1,000,000 gallons of purified water per 24 hours, and the pumping installation therefore allows a 100 per cent margin of safety.

The raw water is first mixed with sulphate of alumina and lime on the coagulation principle, so as to bring down every trace of finely suspended material, and is then filtered through six "Paterson" horizontal closed pressure sand filters. Each of these is 20-ft. 0-in. long and 8-ft. 0-in. diameter, the duty of one of the pumps being taken by three filters, all of which, along of course with the pumps, are coupled up together by the necessary pipes and control valves.



Filters and Main Pumps of Alor Star water supply plant

The whole of the sand filters, as well as the chemical preparation apparatus for the coagulents, have been supplied by the Paterson Engineering Co., Ltd. (Windsor House, Kingsway, London, W.C. 2). and the filters are on the firm's standard principle with cleaning by means of compressed air, the same sand lasting for years. The latter consists of a special variety of graded and washed sand supported on under layers of pebbles, beneath which is the firm's "manifold" filter under-drain system, so as to ensure uniform collection of the clear and filtered water from the whole area of the bed, as well as uniform distribution of the compressed air for cleaning.

Further, and highly important in view of the danger from cholera in using the untreated water, there are included two Paterson "Pulser" type "Chloronomes" for the continuous and automatic addition of a measured trace of chlorine gas, which is passed into the filtered water against a pressure of nearly 300 feet per head. It is well known that chlorine is a powerful sterilizing agent and destroys immediately all bacteria, even in the most polluted water, while the use of chlorine gas in cylinders is a very great advantage, especially in tropical countries, as it is

(Continued on page 188)

Chain Cable and Anchor Testing Machine Has Capacity 750 Tons

THE ever increasing size of passenger and cargo vessels has brought about the installation by Lloyds British Testing Co., Ltd., Netherton, Dudley, of a testing machine of larger capacity constructed to the Testing Co.'s specification and that of the Board of Trade, capable of testing not only the chain cable and anchors necessary for the largest vessels yet contemplated, but also all sizes of steel wire ropes, wire rope pulley blocks and other miscellaneous specimens.

This machine is the largest lever type chain cable and anchor testing machine yet constructed, having a capacity of 750 tons, and has been made by W. & T. Avery, Ltd. at their famous Soho Foundry, Birmingham. Fig. 1 gives an indication of its massive proportions. The overall length is 178-ft. 6-in., the overall width 21-ft., and the overall height 17-ft. Part of the machine is sunk below the floor of the test house, so that the overall height above the floor level is 10-ft.

The sinking of the machine in the floor is necessary to facilitate the handling of heavy specimens. It also permits perfect freedom for the operator around the steelyard, provision having been made to carry floor plates from the standard and upon ledges cast on the several suspension gear brackets.

The total weight of the testing machine is about 250 tons. A number of the components each weigh over 10 tons, the heaviest being the main base plate, which is in two parts, the complete casting weighing 36 tons.

The machine is of the fixed frame type. That is, the weighing portion is arranged at one end, and the straining portion at the other end of a frame or bed rigidly secured to the foundations.

Suitable gripping attachments hold the specimen to be tested between the weighing and the straining portions of the machine.

The straining portion comprises a large cylinder and ram (of the single acting type) for applying the strain, and a smaller cylinder and ram (also of the single acting type) for returning the main ram and attachments to position after a test. Both cylinders are steel castings and are provided with the usual hydraulic packing. The main cylinder is designed for an accumulator pressure supply of two tons per square inch, and the return cylinder is suitable for a pressure of ½ ton per square inch.

As it is not anticipated that the machine will regularly be required for testing to loads near its full capacity, and to permit of an economy of pressure water, an inner ram has been provided at the suggestion of Mr. Henry Green, M.I.M.E., Superintendent of the Proof House, Netherton, to operate inside the main ram which then functions as a cylinder. When the machine is used at the lowest capacity, the main ram is locked in its innermost position in the main straining cylinder by means of shear pins in the upper and lower tie bars secured to the straining and return cylinders. The locking and unlocking of the main ram to these two tie bars is carried out simultaneously by the operation of a single handwheel.

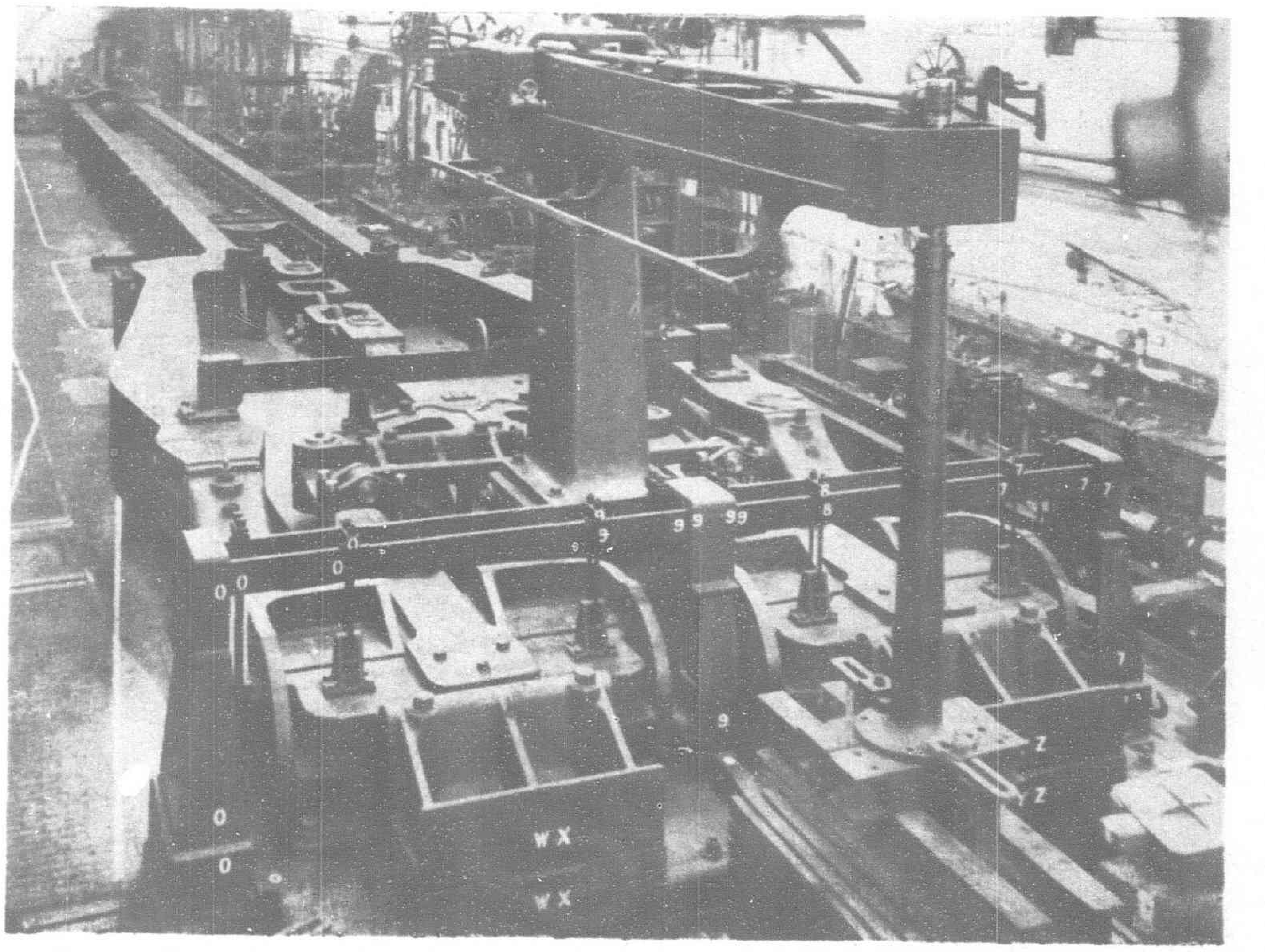


Fig. 1.—General view from Weighing End shows massive proportions of the machine

The main straining ram is 24-in. diameter and the inner straining ram is 12-in. diameter. The stroke of either the main or the inner ram is 9-ft. The ram of the return cylinder is 12-in. diameter, but the length of the return cylinder is rather longer than that necessary for a ram of 9-ft. stroke. This permits of a water cushion at the back of the ram of the return cylinder to absorb any excessive recoil which may occur if a specimen breaks when the main ram is near the end of its stroke. Another safety device to nullify recoil effects at the straining end of the machine is a large spring loaded valve, directly at the end of the return cylinder. This can be set to relieve at the pressure desired, and is open to atmosphere: any effusion from this source falls into a pit immediately below the valve.

To prevent corrosion and facilitate smooth action, and to permit pressure maintenance, when required for a period, the main and inner straining rams have been surfaced by the Fescol Process with electrically deposited nickel. This was suggested by Mr. George Hatton, C.E. the Chairman of Lloyds British Testing Co., Ltd.

The pressure supply to the main and return cylinders is governed by a special four-spindle valve of the interlocked type. This is located adjacent to the steelyard to permit centralization of the machine control.

The main straining cylinder is fitted in the bore of a large steel anchor casting to which it is secured by adequate steel studs.

An iron base casting projects from the main cylinder anchor casting towards the return cylinder to serve as a guide for the crosshead, which is secured to the straining ram. It is through the medium of this crosshead that the strain is applied to the specimen. Long tension bars are secured to the crosshead and extend into a trough between the straining and weighing portions, to within approximately 30-ft. of the main base casting at the weighing end of the machine. The tension bars are bored at intervals of 3-ft. (except at the joints where the pitch is 4-ft.) to allow specimens of various lengths from 3-ft. up to maximum to be tested. Chain cables 100-ft. in length may be secured to and tested in the standard jaw and pin shackles embodied in the machine, but special holders of the form shown in Fig. 2 have also been provided for testing samples of chain cable made from material 4⅜-in. diameter. With these holders in use, the machine will still accommodate the standard proof specimen of 15 fathom length.

One of the holders is in connection with the weighing portion of the machine (described later) and the other—the straining holder—is made suitable for ready attachment at any of the bored holes in the tension bars. This holder is secured by means of two shear pins, one on either side, which are simultaneously operated through gearing by a hand wheel to engage in the tension bars.

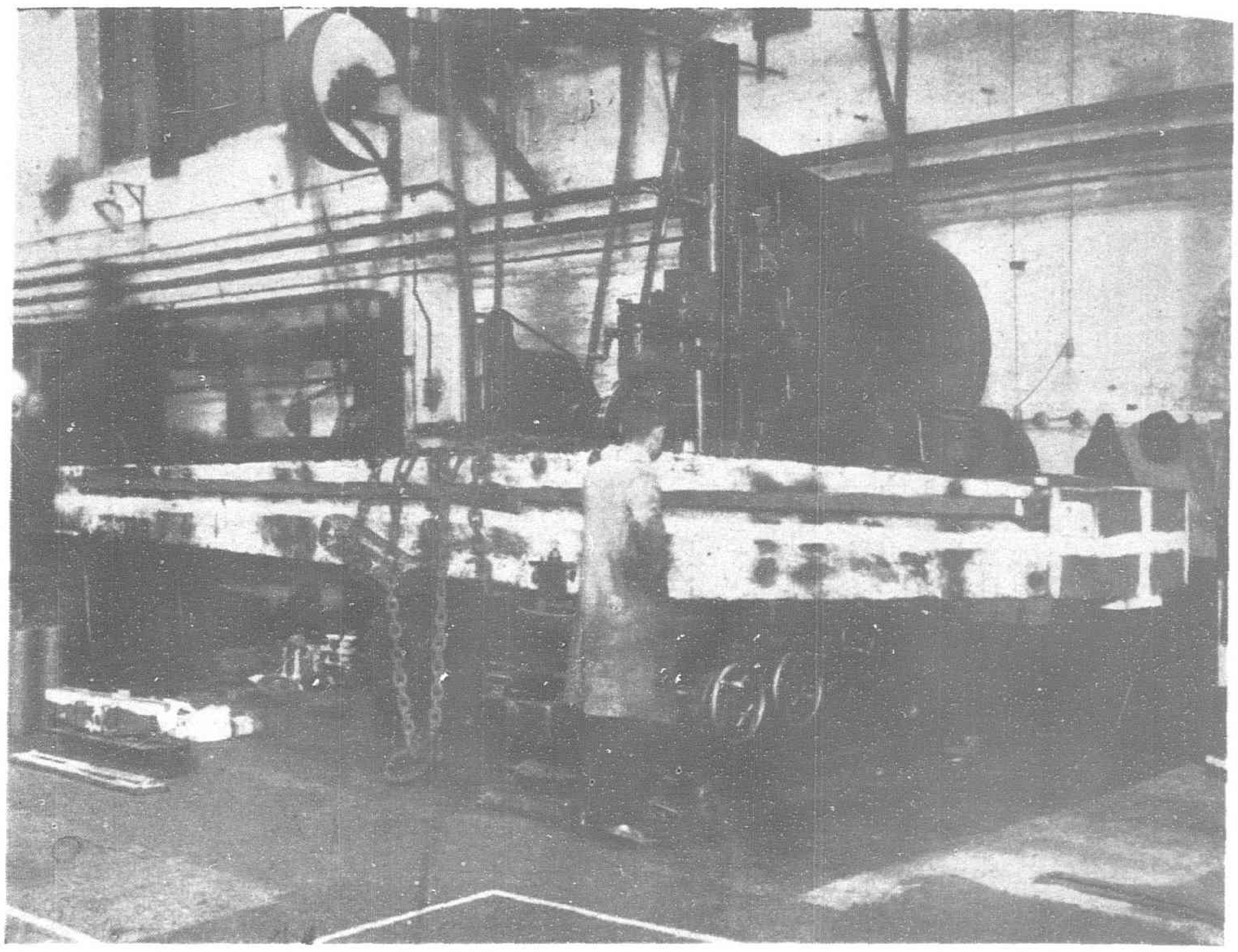
The trough is built up of iron castings in six sections. It is 4-ft. 6-in. wide and provided with rollers to facilitate the free movement of the tension bars. It also has a machined track along which the straining holder is moved on rollers when an adjustment in its position is required.

The two tension bars are built up of sections of steel very accurately machined and dovetailed together.

A bay is provided for the testing of anchors, wire rope pulley blocks and other specimens of greater depth than the depth of the testing trough. The bay is made by two robust struts secured at one end to the main base casting, and at the other end to a steel bridge casting which terminates the trough.

The width of the anchor bay at this end is 9-ft. opening out to 13-ft. at the main base casting. The length of the bay is 20-ft. from the centre of the eye of the shackle, making it possible to test anchors 12-ft. over the palms. The weight of such an anchor is about 20 tons, and to accommodate anchors of this size, a pit 4-ft. 6-in. deep is provided in the foundations. In order that the anchor bay may be clear for testing anchors, the tension racks are not allowed to protrude into the anchor bay, and master bars are provided to enable the holders to be brought together to permit the testing of short specimens down to 3-ft. in length. When testing cables, the pit below the anchor bay is covered with heavy steel plates designed for ready handling and supported upon ledges provided on the inside of the strut castings. The cover plates have machines tracks which continue on from those in the trough castings, and to ensure that the tracks are in line the sections are spigotted together. Thus the straining holder may be moved from one end of the machine to the other.

To facilitate easy handling of cable specimens, large vertical rollers are provided adjoining the anchor bay, and supported upon the steel bridge casting at the end of the trough. They are provided with ball bearings and are therefore quite free to revolve. These rollers are utilized when specimens are drawn along the trough of the machine, for which purpose an electrically driven winch, located at the straining end of the machine, is used.



Machining one of the castings

The specimen holder at the weighing end of the machine is in connection with two bell crank levers which transmit the strain on the specimen to the steelyard, where it is balanced off by a poise weight. The bell crank levers, which are steel castings, are arranged, one on either side of the standard supporting the steelyard. The final connection between these main levers and the weighing holder is made by means of a large triangular steel casting, at the near end of which the two main connecting links are secured by means of shear pins. Each link is built up of steel casting sides and a heavy steel backing to receive the main bearing which engages the load knife-edge of the main lever. The leverage ratio of these levers is 7½ to 1, and each is fitted with a load and fulcrum knife-edge 77-in. long. This length is in accordance with the Board of Trade regulation that the loading of knife-edges in a testing machine must not exceed 5 tons per lineal inch. The knife-edges are produced from special steel, and are hardened and ground accurately to gauge. Two heavy steel castings rigidly bolted to the main base, one on either side of the standard for the steelyard, provide the fulcra for the main levers, and each fulcrum bracket is fitted with a special hardened steel bearing 77-in. in length.

Both the main levers and links, and the triangular-shaped link connecting to the weighing holder, are supported upon knife edges to ensure perfect weighing freedom.

To permit of the transmission of the load from the main levers to the steelyard, a wide steel yoke casting is utilized, having slung along at its ends two connecting shackles, each provided with a hardened steel bearing to engage the transmission knife edge of main lever. The upper end of the yoke-casting is linked up with the load knife-edge of the steelyard by means of another link fitted with a hardened steel bearing. The complete connection between the main levers and the steelyard permits the action of a full universal joint, to ensure alignment. The necessary bearing for the fulcrum knife-edge of the steelyard is fitted at the top of the standard erected upon the main base casting for this purpose.

A complete set of gauges has been provided for periodically checking over the levers of the machine.

The steelyard is built up of steel plates suitably crossbraced. It is traversed by a poise

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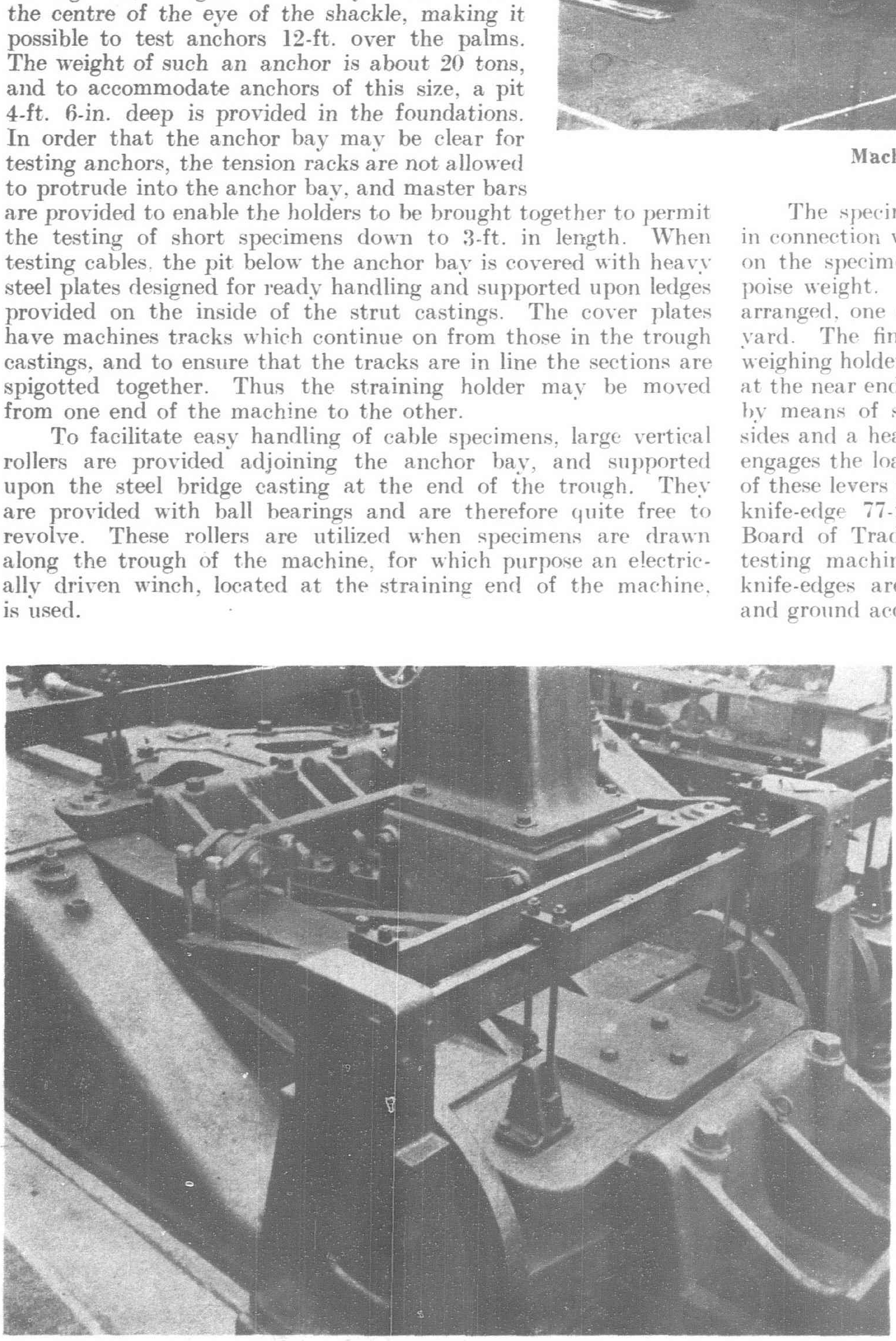
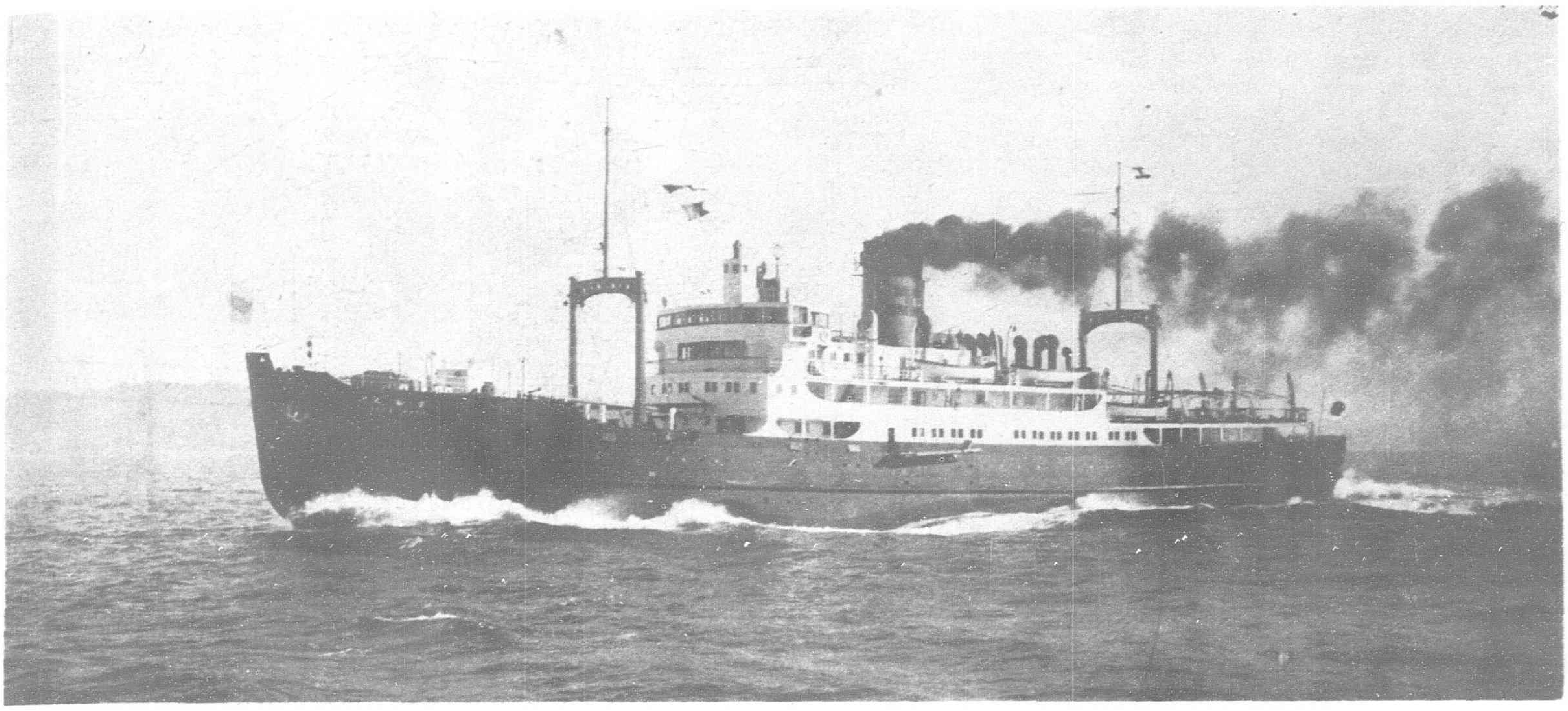


Main Levers, Links, Suspension Gear and Recoil Gear



S.S. "Soya Maru" as she appeared on her trial run

S.S. "Soya Maru" of the Imperial Japanese Government Railways

The Latest and Most Powerful Ice-Breaking Passenger Steamer in the Orient

By Y. TAJI, M.I.N.A., M.I.Mar.E.

The winter of Northern Japan and Sakhalin particularly in January and February, is so severely cold that the surface of the sea between these two islands is frozen thick, often thicker than eight feet whilst a vast area of some fifty miles long is generally covered by hard ice of over one and a half feet. Unless the channel steamers of the Imperial Japanese Government Railways penetrate through such a long distance of hard frozen sea, communications between Wakkanai of Hokkaido and Otomari of Karafuto are impossible in winter time. Operation of ships is very difficult and several disasters took place in the past few years, the s.s. *Tsushima Maru* having stranded and the s.s. *Iki Maru* having been seriously damaged, but the ice-breaking passenger steamer *Aniwa Maru* only has been able to carry on the duty imposed. From such bitter experience, the authorities concluded that vessels smaller or less powerful than the *Aniwa Maru* are unable to maintain a sufficient ice-breaking capacity on this difficult route, although this vessel appears somewhat over-sized for the volume of traffic on this line of communication.

Consequently, in designing the *Soya Maru*, the experience of the *Aniwa Maru* was taken as the standard, and numerous improvements were embodied after careful consideration in order to augment the over-all efficiency of the vessel, so that the ship is probably the most powerful and up-to-date ice-breaking passenger vessel in the Far East.

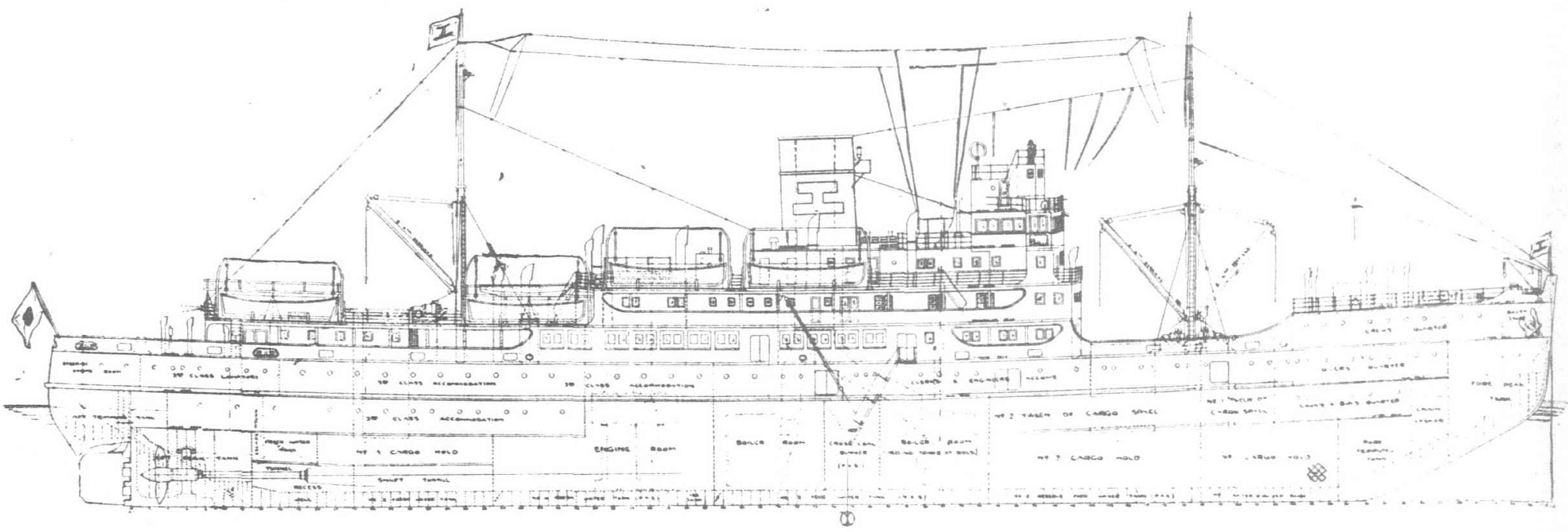
S.S. "Soya Maru" at her launching

The principal particulars and leading characteristics are as follows :—

Length over-all	99.974 meters.
Length between perpendiculars	94.488 ,,
Breadth moulded ..	14.173 ,,
Depth moulded to superstructure deck ..	9.174 ,,
Gross register tonnage ..	3,593.16 tons
Maximum speed.. ..	17 knots
Number of passengers :—	
First class state rooms	18
Second class state rooms	32
Compartments ..	70
Third class compartments	670
Total	790
Ship's complement ..	87
Cargo hold capacity, total	1,734 cub.m. (578 tons)
Coal bunker capacity ..	200 tons
Fresh water	158 ,,
Feed water	243 ,,
Forward trimming tank	203 ,,
Aftward trimming tank	140 ,,
Side heeling tanks ..	76 ,,

Main engines :—

Two sets of triple expansion three cylinder steam reciprocating engines of latest type.



Cross Section showing Internal Arrangements

Boilers :—

Four sets of marine cylindrical single-ended boilers, working steam pressure at 200 lb. per sq. in. B.H.P. 5 581.

Propellers :—

Two sets of nickel-steel detachable blades type, diameter 3,850 mm. and pitch 5,450 mm.

Main generators :—

Two sets of 200-volts 90 kw. turbo-generators.

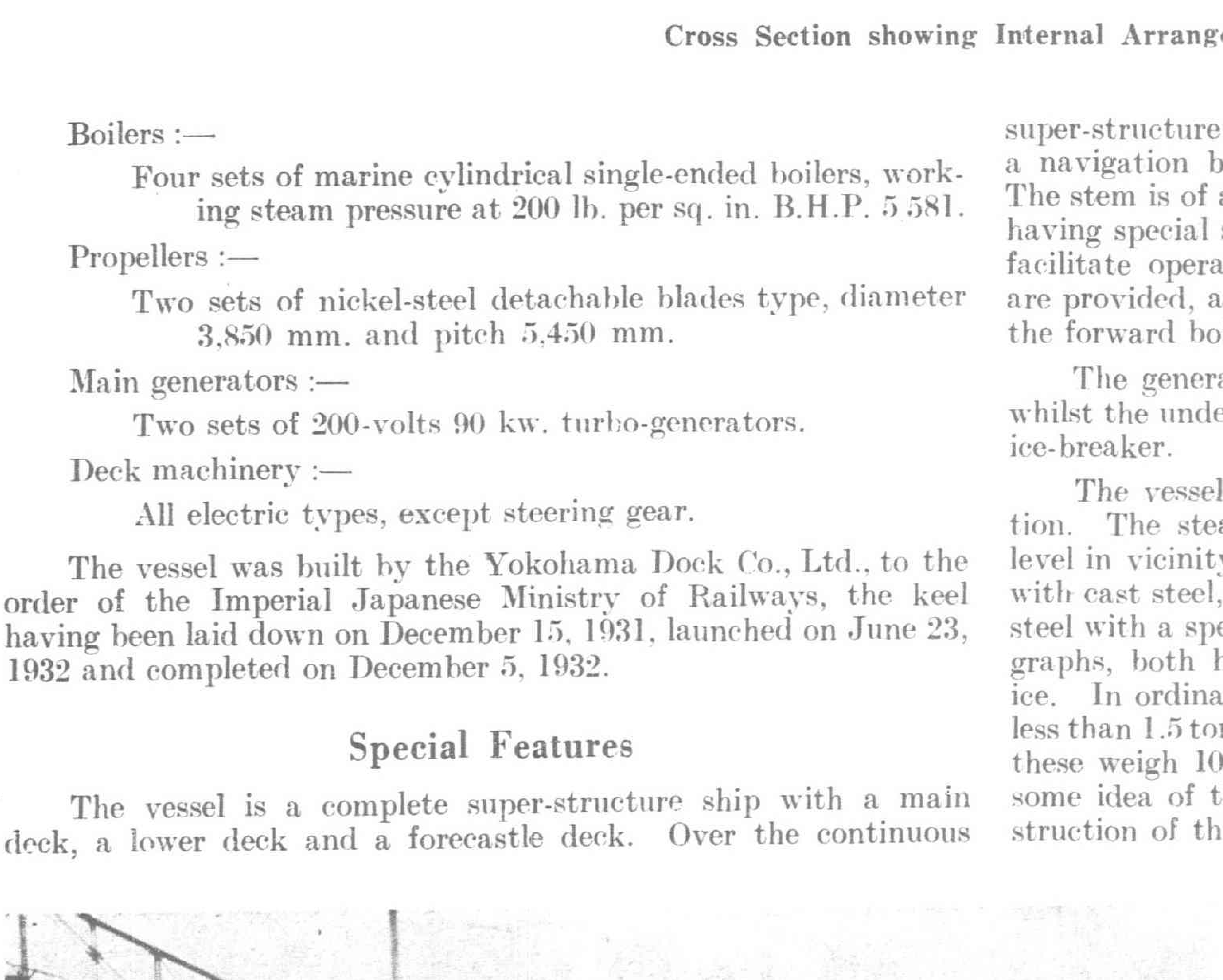
Deck machinery :—

All electric types, except steering gear.

The vessel was built by the Yokohama Dock Co., Ltd., to the order of the Imperial Japanese Ministry of Railways, the keel having been laid down on December 15, 1931, launched on June 23, 1932 and completed on December 5, 1932.

Special Features

The vessel is a complete super-structure ship with a main deck, a lower deck and a forecastle deck. Over the continuous super-structure deck amidships are a promenade deck, a boat deck, a navigation bridge, a watch platform and a compass platform. The stem is of a raked type, and the stern is of a cruiser type, both having special shapes for the ice-breaking operations. Further, to facilitate operation, fore and aft peak tanks and trimming tanks are provided, and also heeling tanks are arranged on both sides of the forward boiler room.



Showing Stern Lines and Rudder of the Vessel

The general appearance of the vessel afloat is very dignified, whilst the under water form is very similar to the typical European ice-breaker.

The vessel has many special features in design and construction. The steam has an inclination of about 27 degrees to the level in vicinity of the water line and is constructed very strongly with cast steel, whilst the stern post is also of similarly strong cast steel with a special shape as seen in accompanying plan and photographs, both having ample strength for the purpose of breaking ice. In ordinary ships of this size, the weight of stem is generally less than 1.5 tons and the stern post about three tons, but in this ship these weigh 10.06 tons and 22.45 tons respectively ; this will give some idea of the rigidity and strength of the bow and stern construction of this vessel. Special web frames and side longitudinal stringers are fitted throughout the whole length of the ship and extra intermediate frames are provided in the fore and aft peak tanks. Outside plating of 918 square meters from 1,960 sq.m. of the total bottom area below the water line i.e. 47 per cent of the whole area is covered by steel plating one inch thick.

Bilge keels are of steel plates one inch thick with a width of 12 inches fitted with round bars at edges and fastened strongly to the bottom with double angles. Thus, the total weight of steel used in the hull construction is increased by some 300 tons in comparison with that of ordinary construction of similar size vessels.

Apart from the fore and aft trimming tanks, the adoption of heeling tanks at sides amidships is also an important improvement in facilitating ice-breaking operations. In order to protect propeller shafts from errosion, the surfaces of the exposed shafts are covered by vulcanite about three-quarters of an inch thick, this being the first trial in a Japanese merchant ship of large type.

Not only for ice-breaking, but also for the usual navigation in other seasons than winter, the vessel is designed as economically as possible in operation. For this very exhaustive model, tests were carried out in a governmental experimental tank in order to ensure the most efficient ship's form and particulars of the propellers, etc. Further, a Yokohama patent double-plated stream-line shaped rudder and a stream-line

First and Second Class Social Room looking aft

First and Second Class Dining-Room

shaped funnel have been adopted. Thus, every possible precaution has been taken for the most efficient and economical propulsion, so that a great improvement has been achieved in comparison with the *Aniwa Maru.*

It is worthy to note that practically all materials including various fittings and equipment for both the hull and machinery are of solely Japanese make, except timber and some patent instruments.

The hull is subdivided into forward peak and trimming tanks, Nos. 1 and 2 cargo holds, a forward boiler room, cross coal bunkers, an aftward boiler room, and engine room, No. 3 cargo hold, aft peak and trimming tanks.

On the boat deck are a captain's room, a chief officer's room, second and third officer's rooms, a wireless telegraphy room connected with the operators' room, officers' lavatories and bath-room, thermo-tank rooms, a large emergency dynamo and a motor generator room. Four life-boats are stowed on this deck and two electric boat winches are provided.

The promenade deck is for the first and second class passengers' accommodation. The foremost part is occupied by a spacious first and second class dining-saloon and a social room decorated attractively. On both sides of the funnel and engine openings abaft these rooms are state rooms, entrances, first and second class lavatories. On the aft half of this deck are four life-boats, a Japanese junk ("temma") and a cargo hatchway, for which two 2 ton electric winches are provided.

The upper deck (i.e. awning deck) amidships is for second class accommodation. A spacious Japanese room lined with "tatami" and covered by carpets is situated in the front part adjacent to the main entrance amidships and the aftward part is allotted for large sleeping rooms; between these rooms and the entrance hall are second class lavatories, a funnel opening, a purser's room, and main stairway. The foremost part of this deck is for sailors' accommodation, where are a large sailors' sleeping compartment and mess, a quartermaster's room, carpenter's and storekeeper's rooms, a boatswain's room, a crew's galley, lavatories, baths, stores and a lamp room. Between the sailors' quarters and the second class passengers' quarters are two cargo hatchways for which four electric winches are provided. In the aft part of this deck, a third class smoking-room, third class entrance and a thermo-tank room are arranged. An electric capstan, a compass, a docking telegraph, an engine telegraph and other necessary mooring outfittings are fitted at the stern.

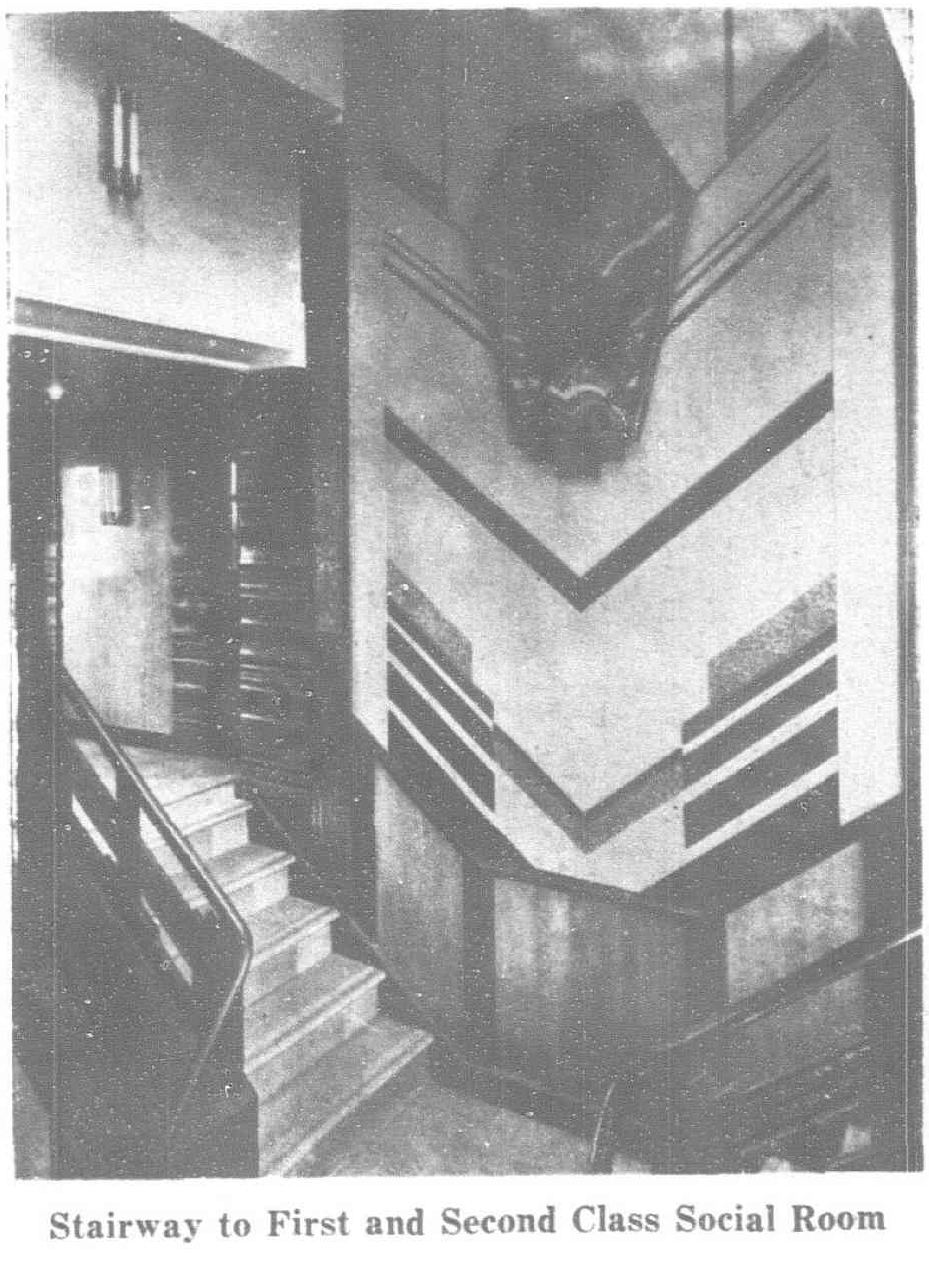
In the forward half of the main deck are a chief engineer's room, engineer officers' rooms, a chief clerk's room, clerks' and stewards' rooms, a clerks' office, a large galley and a scullery, a senior and junior officers' mess-room, baths and lavatories whilst the foremost parts are for stokers', oilers', boys' rooms, lavatories, baths, a carpenters' shop and a forward peak tank. The aft half of this deck is arranged for very spacious and comfortable Japanese rooms for third class passengers, a hospital, third class lavatories, and a steering engine room. A large third compartment is also arranged in aft part of the lower deck, whilst boys', talley men's and cooks' rooms are provided at the forward part.

Systems of decoration of all public rooms are outstanding features, these being a combination of ultra-modern French style and an old tranquil style with Japanese seasoning, as shown in photographs of the first and second class social rooms, and staircase. A warm and cosy sensation is given in the decoration of the first and second class dining-saloons, the walls being panelled with lacquered wood with painting of tropical plants, whilst those of the social room are paneled with South American hard wood combined with special soft Japanese wood, and the staircase is in so-called latest "black and red" style.

Various Appliances and Special Equipments

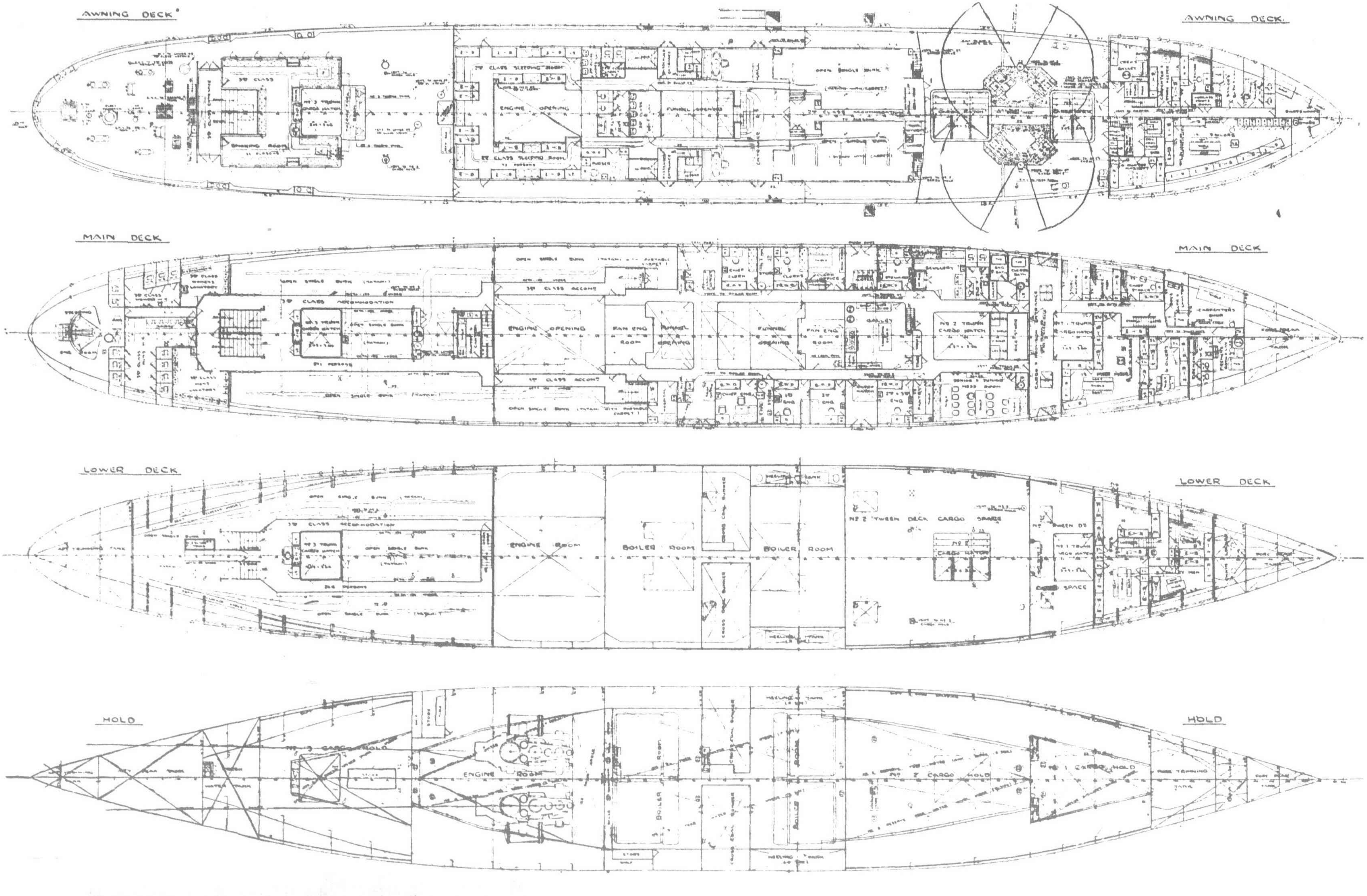
Cargo facilities comprise fore and aft twin posts fitted with six ton and four ton derrick booms, to which four 2 ton and two 3 ton Mitsubishi electric cargo winches are provided.

Special precaution has been taken for the anchoring and mooring arrangements to suit the outstanding duty imposed on an ice-breaker. The windlass is electrically driven by a motor of 60 h.p. through a "booster" system and is also capable of driving a forward capstan. The aftward capstan is also driven by an electric motor of 50 h.p. under "booster" system, whilst all necessary fittings for the mooring of the ship are completely provided so as to ensure easy and speedy handling. All machinery exposed on deck is electrically driven in order to avoid trouble in freezing cold weather, whilst the steering gear is of a quadrant type directly coupled to a vertical two-cylinder steam engine.



Stairway to First and Second Class Social Room

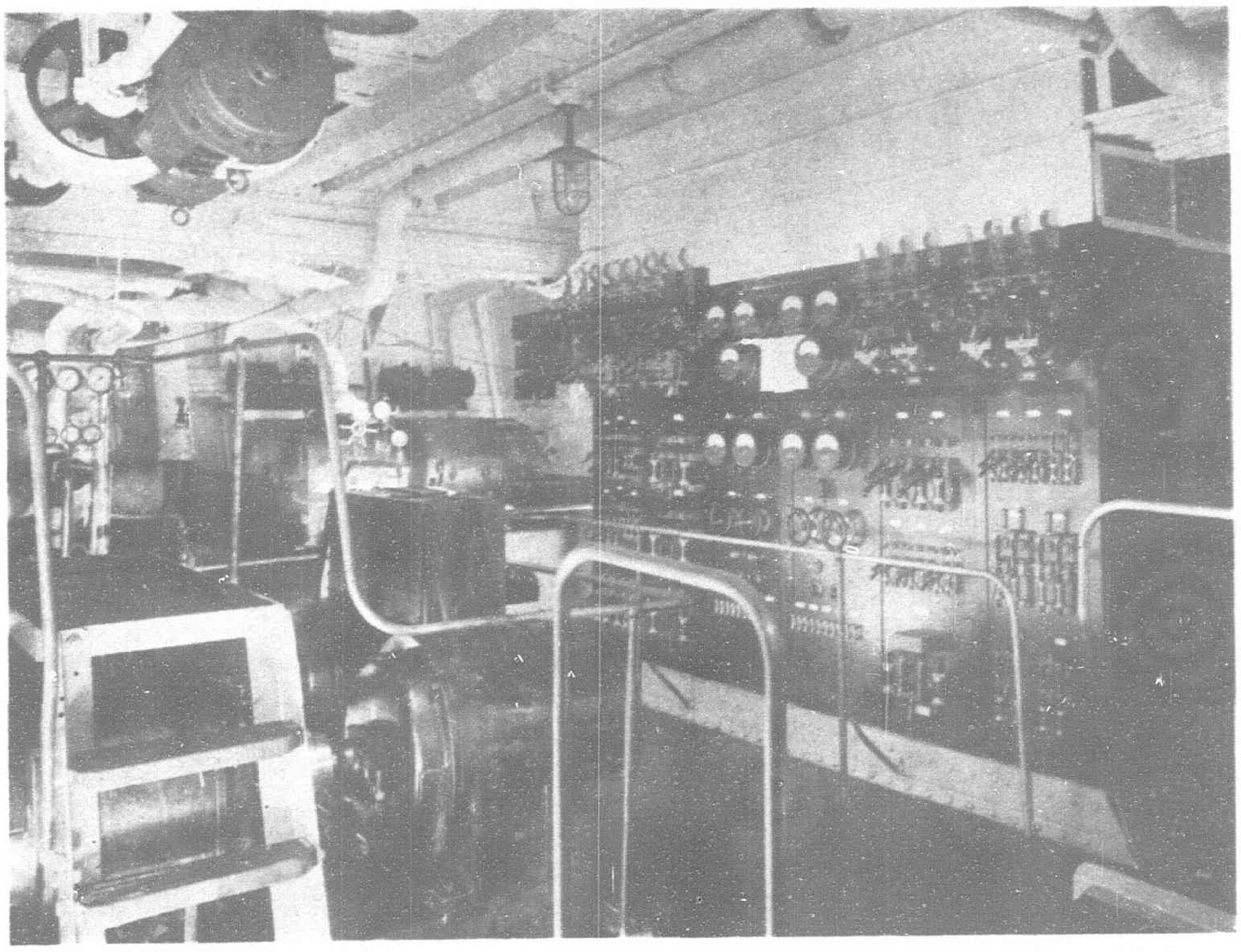
GENERAL ARRANGEMENTS ON DECKS OF S.S. "SOYA MARU"



Life-saving appliances comprise seven 25-ft. life-boats, one 25-ft. motor life-boat driven by a 20 h.p. gasoline engine, and one 19.5-ft. Japanese junk, of which the motor life-boat and three life-boats are stowed on the boat deck, while all others are on the promenade deck aft, as mentioned before, these being handled by two electric boat winches and cargo electric winches.

Special care has been taken for heating and ventilation of the ship, as these are very important in a vessel operating in the frozen sea. Well protected thermo-tank rooms are arranged on the forecastle deck, boat deck amidships and the upper deck aft, equipped with five thermo-tanks of large type, so that all living spaces are well ventilated and heated at nearly constant temperature whilst the vessel is at sea. For heating officers' and men's quarters while in port, steam radiators are also fitted utilizing surplus steam from main boilers. Each thermo-tank has an ample capacity to change air in each allotted space in a rate of twelve times per hour, all the thermo-tanks having been specially designed and built by the Yokohama Dock Company. Fresh water tanks and sanitary tanks on the deck are also well protected from freezing.

Navigating appliances are also exceptionally well completed to withstand the difficulty of navigating on frozen seas. These consist of steering telemotors, electric engine telegraphs, electric helm indicators, a Fessenden's echo sounding machine, a sal log, a Taffrail's log, a Colster wireless direction finder, a complete wireless telegraphy and telephony installation, Siemens-Halske's loud-speaking telephones, automatic exchange inter-communicating telephones, electric clocks and all other necessary instruments of the most up-to-date type, so that the wheel-house is of unusual size with a special watch platform over it. All these instruments, except where specially stated, are of Japanese make.



S.S. "Soya Maru" Engine Room, Starboard Aftward showing a 90 kw. Turbo-Generator, Main Switch-Board, a 25 kw Motor Generator, a Telegraph Motor Generator and a 7.5 h.p. Motor in Ceiling

Propelling Machinery

The suitability of steam reciprocating machines for ice-breakers is a well-recognized fact, although Diesel engines have recently been adopted in some cases. The Japanese Ministry of Railways has been of opinion that the well-tried steam engines with the most up-to-date improvements are still advantageous for such special duties as imposed on this route. Consequently, the vessel has been equipped with two sets of triple expansion engines of the latest design with four sets of marine cylindrical forced-draught boilers, developing normally 5,500 h.p at full power. In ice-breaking operations, the full power is used, but for scheduled navigation in summer, not more than one half power being necessary, only two boilers are used.

In view of the necessity for very punctual operation in connection with the government's railways time table, the machinery is not only designed with ample margin in every part, but also is made easily interchangeable in case of any trouble in its adjustment; therefore, all important parts are made in duplicate.

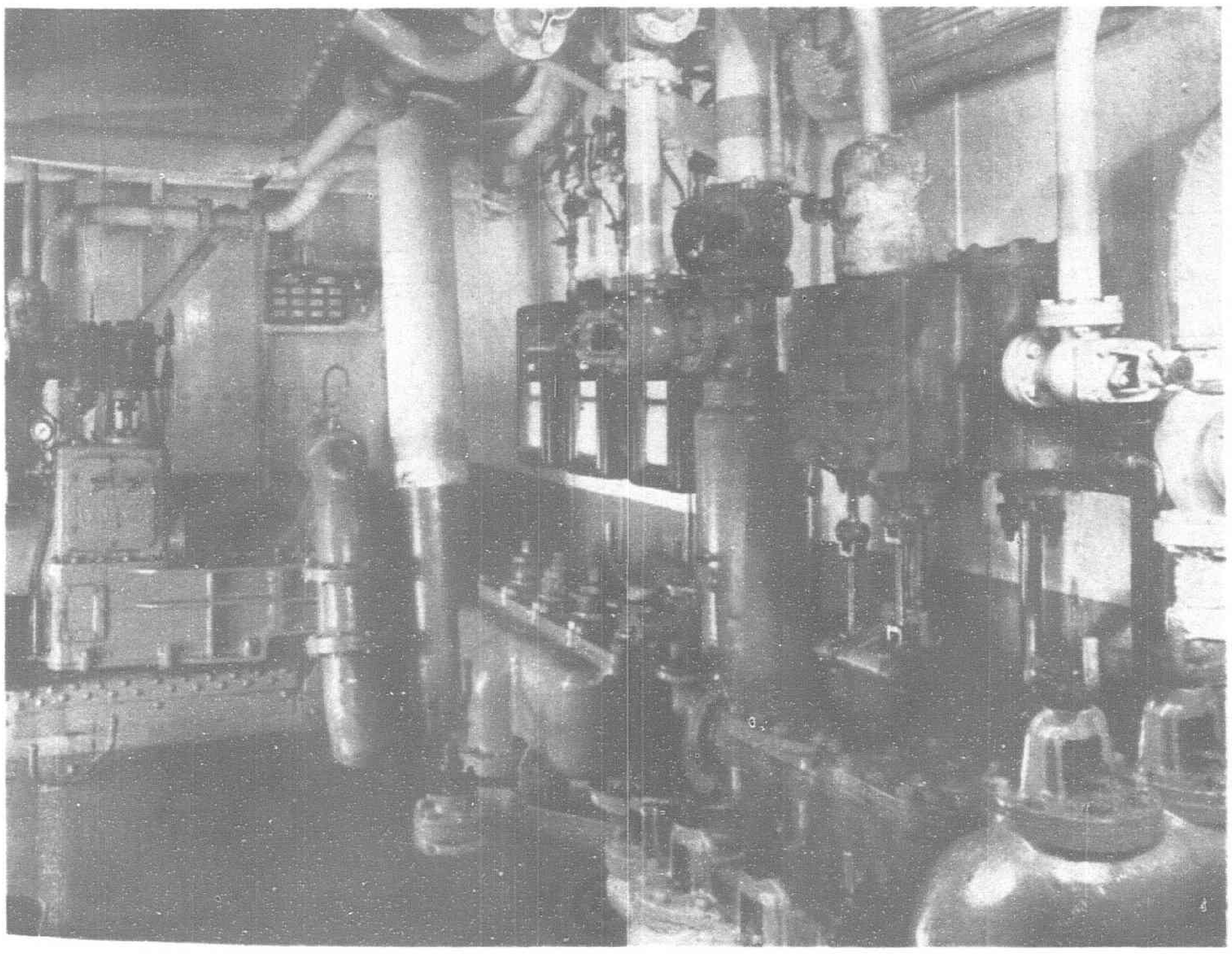
All materials used are of Japanese make except a few patent instruments, and the design, construction and materials are of the most superior degree, whilst the latest type of instruments are fitted, so that the handling of engines and various measurements can be most conveniently and effectively transacted.

Each engine has three cylinders with a bore of 525 mm. in h.p., 875 mm. in i.p. and 1,450 mm. in l.p., and the stroke is 1,100 mm., r.p.m., 112 at a full power of 5,500.

The engine is fitted with an air pump, a sanitary and bilge pump, a bilge pump and reversing engine, whilst the turning device is operated by 7.5 h.p. a.c. and D.C. electric motors, the a.c. motor being used in dock only and operatable from an electric source of either 50-cycles or 60-cycles.

The condenser has a cooling area of about 202 sq. meters, water being circulated by an independent circulating pump directly coupled to a steam engine. In order to prevent trouble due to entrance of ice into the condensers and frozen ice at Kingston valves, an iceless tank is provided at the suction side of each circulating pump, and water after cooling is first discharged to these tanks so as not to freeze even in very cold climate.

Further, steam-meters are fitted to the main steam pipes to the propelling engines and also to auxiliary steam pipes, these being of Otic type specially manufactured by Messrs. Kato



Engine Room, Port Forward, showing a Trimming Pump, Otic Steam Meters and Ballast Pump

Engineering Co. of Tokyo, in which a recorder of magnetic U tube type and venturi tubes are used.

The propellers are of 4 per cent nickel steel and were designed under model tests in the experimental tank of the Ministry of Communications in order to ensure maximum efficiency. The surface of propeller shaft between brass sleeves are lined with vulcanite under special process of the Meiji Rubber Co. of Tokyo.

Main Boilers

These are of a marine return-tube, forced-draught type with three furnaces, the diameter being fifteen feet six inches, length twelve feet, working pressure 13.6 kgs. per sq. cm., total heating surface about 2,770 sq. ft. and furnace area about 65.2 sq. ft.

Air is supplied to the boilers by two direct steam driven forced draught fans through Yokohama patent air preheaters. This perheater comprises numerous thin steel plates, one side of which being in contact with flue gas, while air passes along the other side ; its heating surface being very large, quite a high efficiency has been achieved in various trials.

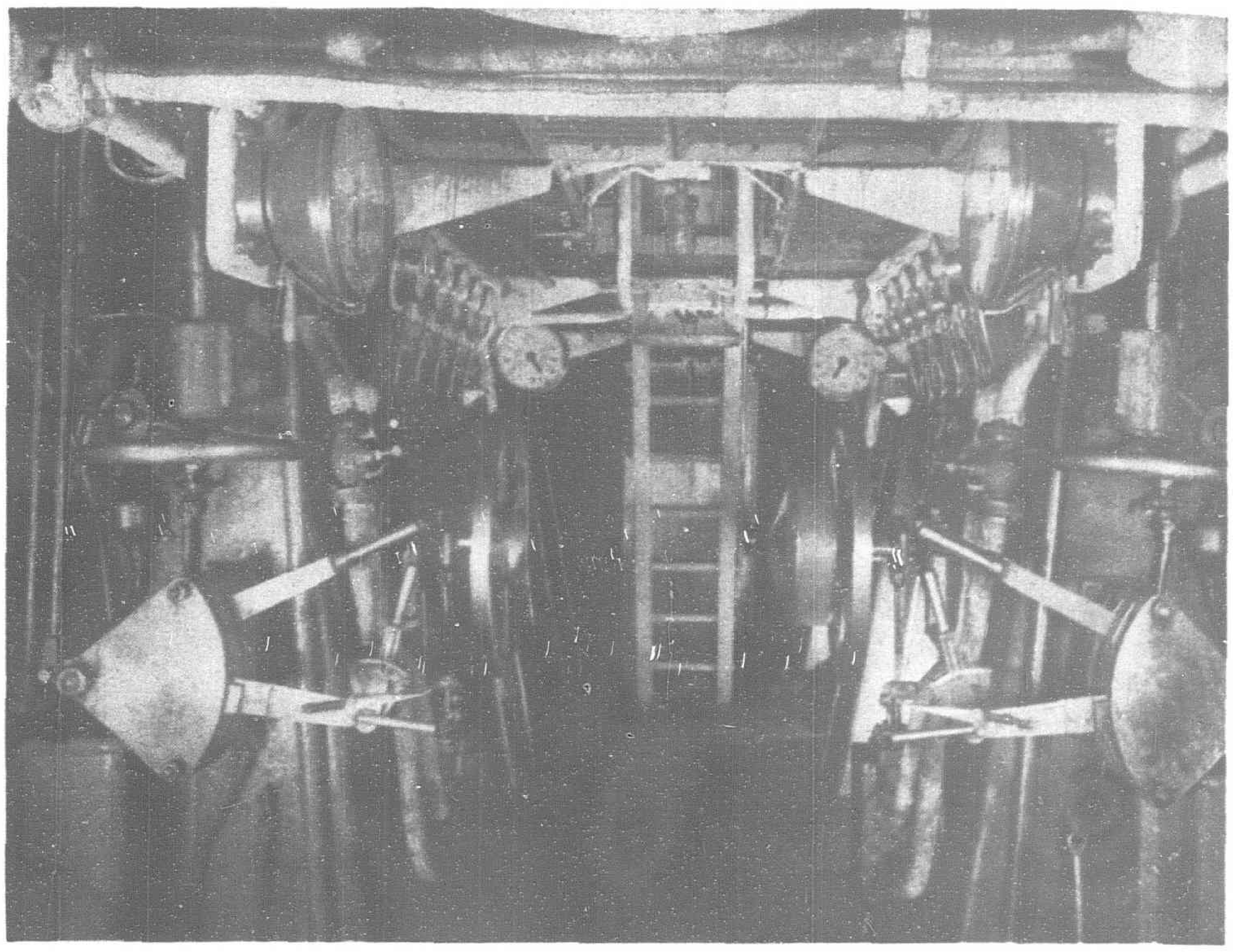
Each boiler is fitted with a Nakamura's soot blower, a feed water circulator, a Siemen's thermo-electric pyrometer for the measurement of flue gas temperatures, a CO_2 meter of Siemen's mechanical Ralex type for the flue gas analysis. Apart from ordinary steam whistles, a fog-signalling automatic whistler has been supplied by Messrs. Asamuma Co. of Osaka.

Electric Generators

Practically all deck machinery of this vessel being electrically driven and also power required for lighting being considerable, there are two sets of 90 kw. 220-volt turbo-generators, two sets of 25 kw. 110-volt motor-generators, and one set of 10 kw. 110-volt emergency dynamo direct coupled to a gasoline engine. Of these machines, one of the two 90 kw. generators supplies current to all electric motors, leaving the other as spare, whilst one of 25 kw. motor-generators is for electric lighting and the other is also spare. The turbo-generators are driven by impulse steam turbines manufactured by the Ishikawajima Dockyard Co., Ltd., through reduction gearing, whilst the dynamos were supplied by the Shibaura Engineering Works, Ltd. For the two turbo-generators, one independent auxiliary condenser and one circulating pump directly coupled to an auxiliary turbine are installed.

Auxiliary Machinery

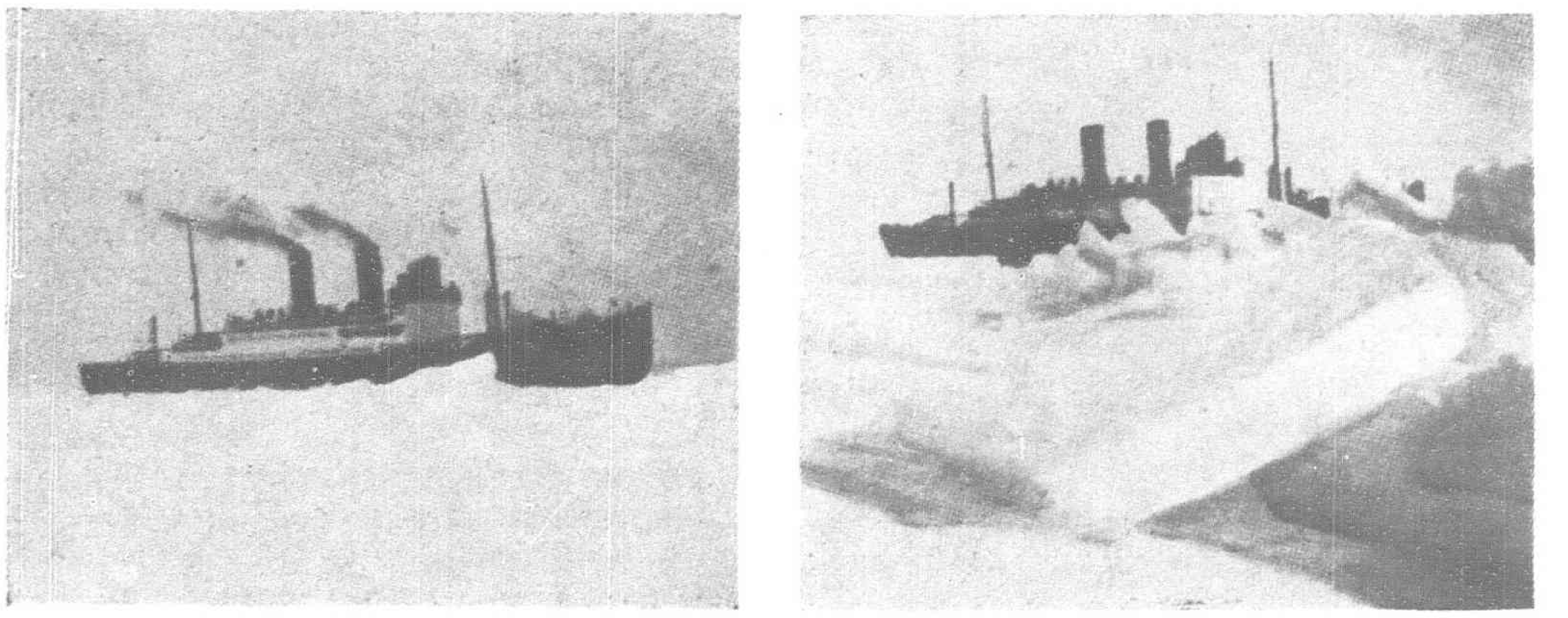
Equipment installed in the engine room and boiler rooms is as follows :—



S.S. "Soya Maru" Engine Room, Central Platform

Two —Main feed pumps of vertical single cylinder type with a capacity of 28 tons per hour.
One —Ballast pump of vertical two cylinder type of 70 tons per hr.
One —Sanitary pump of the same type of 16 tons per hour.
One —Fresh water pump ,, ,, 19 ,, ,, ,,
One —Ash ejecting pump ,, ,, 40 ,, ,, ,,
Two —Main circulating pumps ,, ,, 850 ,, ,, ,,
One —Trimming pump of direct steam driven centrifugal type of 350 tons per hour.
One —Engine room ventilating fan of electric driven multi-blades type.
One —Feed water heater of surface heating type.
One —Feed water filter.
Four—Ash ejectors.
One —Hand ash hoist for dock uses.

All these auxiliaries were manufactured by the Yokohama Dock Company, Ltd. Further, one calorifier and one electric centrifugal calorifier pump are fitted in the engine room, whilst in the engineers' workshop, a lathe, a drilling machine, an electric driving motor and other necessary machine tools are installed.



Sister Ship of the "Soya Maru," the Ice-Breaker "Aniwa Maru" at work in the Frozen Seas

Trial Results

Various trials were carried out off Tateyama and Honmoku near the entrance to Bay of Tokyo during November 17 and 22, 1932. A summary of the results of progressive trials, official speed trials and full power trials is given in Table I.

Stop and Astern Trials.—1. The engines were put full power astern (r.p.m. 88) when the vessel was running at full power ahead (r.p.m. 105).

Time required from the order to stop the ship from running ahead .. 1 min. 52 seconds.
Distance run .. .. 860.5-ft.

2. The engines were put full power ahead when the vessel was running at full power astern.

Time required from the order so stop the ship from running astern .. 1 min. 15 secs.
Distance run .. .. 550-ft.

Anchor Hauling Trials.—Bower anchors were separately dropped in the sea at a depth of 64 meters ; the port cable was delivered up to five shackles, whilst the starboard one to the full length, and each side cable was hauled up by the windlass.

Mean hauling speed .. 20 meters per min.

Table I.—A Summary of Speed Trials.

Kind of Trials.		*Progressive.*				*Official Trials.*			*Full Power Trials.*				
Condition before departure.		Draught, fore 4.313, aft 5.387 mean 4.850 in m. Displacement 4,008.8 T. Midship area 64.88 sq. m.				Draught, fore 4.124 M. aft 5.130, mean 4.627 Displacement 3,782.5 T. Midship area 61.744 M².			Draught, fore 4.050, aft 5.180 mean, 4.615 M. Displacement 3,770.345 T. Midship area 61.574 M².				
Weather. Sea. Place.		Fine, temperature 17.2 C° *Slight, flooding to ebbing.* Off Tateyama.				Cloudy, tempr. 14 C° *Slight, ebbing.* Off Tateyama.			Fine, temperature 12 C° *Smooth, flooding.* Off Honmoku.				
Distance of mile posts.		1 N.M. for Nos. 1-4 runs. 2 N.M. for Nos. 5-8 runs.				2 N.M.			2.77 N.M.				
						Speed	Fuel consmpn.	Astern	Full power Trial.			Starbd. engine.	Astern
No. of trial runs.		1-2 mean	3-4 mean	5-6 mean	7-8 mean	1-6 mean	Mean of one hour	1	1	2	mean	3-4 mean	1
Speed in knots.		9.318	11.228	14.329	16.072	16.256	—	—	17.105	17.017	17.061	10.318	—
R.P.M.	Port. Starbrd. Mean	58.0 59.5 58.75	71.15 72.25 71.7	90.75 91.15 90.95	105.85 107.3 106.58	109.17 109.33 109.25	89.5 91.5 90.5	86 87 86.5	115 115 115	115 115 115	115 115 115	— 85.5 —	90 90 90
Propeller slip, percentage.		9.7	11.4	11.0	14.8	15.8	—	—	—	—	16.0	31.7	—
B.H.P.	Port Starbrd. Total	358.9 409.4 768.3	605.9 654.3 1260.2	1220.8 1220.95 2441.75	2053.75 2160.0 4213.75	2263.75 2252.63 4516.38	1165.5 1155.5 2321.0	1535.3 1554.1 3089.4	2949 2856 5805	2978 2919 5897	2963.5 2887.5 5851.0	— 1490.5 —	1546 1500 3046
Steam pressure, kg/sq. cm.	Port Starbrd.	14.0 13.88	14.0 13.75	13.25 13.05	12.95 12.75	12.48 12.03	13.65 13.5	12.6 12.5	13.7 13.3	13.5 13.3	13.6 13.3	— 14	14.0 13.3
Condenser vacum. mm.	Port Starbrd.	697.5 700	697.5 697.5	680 695	660 660	636.7 653.3	680 695	680 680	640 660	740 670	640 665	— 680	670 690
Sea water temperature. C. No. of boilers used		20 4	20 4	20 4	20 4	19 4	19 4	19 4	14 4	14 4	14 4	14 4	14 4
Fuel consumpn.	per hr. kg. per hp/hr.kg.	— —	— —	— —	— —	— —	1813 0.782	— —	— —	— —	— —	— —	— —

Turning Trials.—While the vessel was running ahead with both engines at 75 r.p.m., the rudder was put hard over 35 degrees portside by telemotor, and the advance and turning circle diameter were measured.

1. When both engines were turning ahead.

Time required to put the rudder over 35 degrees from the order ..	7 secs.
Time required to the advance position	1 min. 20 secs.
Tactical diameter	420 meters
Maximum angle of heel	4 degrees

2. When the port side engine was stopped simultaneous to the order for turning the rudder.

Time required to put the rudder over 35 degrees from order ..	7 seconds
Time required to the advance position	1 minute 30 secs.
Tactical diameter	380 meters
Maximum angle of heel	3 degrees

3. When the port side engine was put astern (r.p.m. 78) simultaneous to the order of turning rudder.

Time required to put the rudder over 35 degrees from order	8 seconds
Time required to the advance position	1 minute 15 secs.
Tactical diameter	—
Maximum angle of heel	4 degrees

Trimming Trials.—On November 30, 1932, the trials were carried out in a wet dock by transferring sea water through sea water piping of 20 cm. in diameter using a trimming pump in the engine room, the order having been given by an electric telegraph from the navigation bridge.

Draughts of the vessel were as follows :—

fore	3.910 meters
aft	5.240 ,,
mean	4.575 ,,

1. Half quantity of sea water in the starboard heeling tank was shifted to the port side.

Time required	4 min. 25 secs.
Angle of heel	11 degrees

2. Sea water of about 140 tons in the aft peak tank and aft trimming tank was shifted to the forward peak tank and trimming tank.

Time required	21 min. 56 secs.
Change of trim	2 meters

Comparison with "Aniwa Maru"

As mentioned before, the vessel has been built on the same standard of the well-tried ice-breaking passenger ship *Aniwa Maru* of the Government Railways, but with further improvements in the design, construction and general arrangement. The principal differences in the initial design may be summarized as follows :—

1. *Dimensions.*

	s.s. Soya Maru	*s.s. Aniwa Maru*	*Diff.*
Length over-all	327-ft. 9½-in.	327-ft. 4½-in.	3-in.
Length between perpendrs	310-ft.	310-ft.	0
Breadth	46-ft. 6-in.	45-ft.	1½-ft.
Depth	30-ft.	30-ft.	0
Gross tonnage	3,593-tons	3,355-tons	238 T.

The breadth has been increased by 1½-ft. in the *Soya Maru* in view of the stability due to more passenger accommodations on the upper deck.

Resistance and Propulsion.—Very exhaustive tests were carried out in the Teishinsho Experimental Tank with a six feet model in order to acquire the best possible form for the propulsion.

Owing to the larger breadth of the *Soya Maru*, the displacement is also larger in the vessel, for instance ; at 18-ft. draught, the *Aniwa Maru* displaces water of 4,358 tons, whilst the *Soya Maru* does 4,642 tons, the difference being 284 tons. Comparing the two ships at a constant displacement of 3,730 tons, the relations between speed and power are as follows :—

	s.s. Aniwa Maru	*s.s. Soya Maru*	*Diff.*
Displacement, tons ..	3,730	3,730	0
Draught, ft. and in. ..	16′–2″	15′–3¼″	10¾″
Horse-Power, at 9 knots	700	700	0
,, ,, ,, 11 knots	1,520	1,100	420
,, ,, ,, 16 knots	5,520	3,850	1,670
At a constant draught of 18-ft.			
Displacement, tons ..	4,358	4,642	284
Horse-power at 11½ knots	1,965	1,415	550

Therefore, 550 h.p. per hour is saved in the *Soya Maru* which makes a saving of 4,400 h.p. at eight hours of the usual navigation in summer. Thus, the improvement in this line may be considered very remarkable.

HEATING AND VENTILATION.—As described already, very considerable improvements have been carried out in the *Soya Maru*.

THIRD CLASS PASSENGERS' ACCOMMODATION.—Owing to the democratic tendency of general passengers, special improvements will be perceived in this vessel for the comfort and convenience of this very popular class of passengers.

Chain Cable and Anchor Testing Machine Has Capacity 750 Tons

(Continued from page 180)

which runs on rollers provided with ball bearings. This poise, the travel of which is 200 inches, is made in two portions, the combined weight being two tons. As the machine has been specifically designed to avoid the use of proportional weights suspended from the end of the steelyard, it will readily be appreciated that the total leverage of the machine is 375 to 1. A vernier is fitted to the minor portion of the poise and this indicates the test load upon a scale plate secured by brackets to the steelyard. The same vernier is utilized when the combined poises are used.

The scale plate carries two sets of graduations, the major set, used with the full poise weight, is up to 750 tons by 10 cwt. divisions, but by means of the vernier fitted to the poise, load readings to 1 cwt. are obtained. The minor set of markings used with the minor poise range up to 150 tons by 2 cwt. divisions, the vernier further sub-dividing to 28 lb.

When the minor poise is used, the major portion is locked in position at the back end of the steelyard. The minor portion is detached by the simple operation of two handwheels at the end of the small poise.

A propelling nut of the split variety secured in the minor portion of the poise is provided so that any adjustment necessary on account of wear may readily be made.

The actual propulsion of the poise is carried out by means of the handwheel at the side of the standard supporting the steelyard. It operates a horizontal shaft which, through bevel gears at the back of the standard, transmits the drive, via layshafts and spur gearing to the poise-propelling screw carried on ball bearings in the center of the steelyard and extending from one end to the other. This arrangement of poise drive permits an uninterrupted view of the steelyard scale plate throughout the test.

A flotation pointer, arranged immediately above the handwheel for propelling the poise, readily indicates to the operator the balance of the steelyard.

To absorb shock to the steelyard when a specimen breaks, buffer springs are provided on a carrier column at the long end of the steelyard. It is at the main levers and links, however, where the main recoil shock occurs, and special provision has been made to receive this by a heavy casting directly opposite each main lever and its link. This casting is provided with special hard wooden blocks so adjusted that immediately a break occurs, the recoil is taken up and dissipated.

As the machine with its standard shackles is capable of testing specimens of any length from 3-ft. to 100-ft., leaving available the stroke of the ram, it will be readily understood that the machine can be used for both proving and breaking samples of chain cable, in addition to testing anchors ; whilst by the use of suitable holders samples of wire ropes and a variety of specimens can be tested. The machine, although of such a high capacity, is capable of recording loads by increments of 28 lb. It is thus a very useful addition to the testing equipment of the country, and the co-operation of Mr. George Hatton, C.E., and of Mr. Henry Green, M.I.M.E. has helped to ensure that the machine is particularly suitable for the special purpose for which it is required.

The construction of this machine completes a trio of special high capacity testing machines built by W. & T. Avery, Ltd., in recent years. The first was the Universal Testing machine of 1,250 tons capacity used in connection with the construction of the Sydney Harbor Bridge, while the second was the 1,000,000 lb. Vertical type testing machine made for the Department of Mines, Ontario.

Notable Malaya Plant Supplying Pure Water From Polluted Source

(Continued from page 178)

always a 100 per cent product, so that the dose of chlorine can be regulated with the greatest accuracy, quite different from the use of unstable bleaching powder or hypochlorites.

The results of this plant are highly satisfactory and the average method of operation consists in the use of approximately 0.5 parts of chlorine per 1,000,000 parts of water, along with one grain per gallon of sulphate of alumina and of lime, but varied of course according to the circumstances. In most areas of the world it is generally not necessary to use more than about one part of chlorine per 1,000,000 parts of water, and in this Alor Star scheme, for example, the purified water has no Bacteria coli in 100 c.cs. the standard test for bacteriologically pure water. The raw water however, as already indicated, is very bad, showing Bacteria coli in only 0.01 c.cs, corresponding to 500-600 colonies of bacterial growths in 1 c.c. on Agar plates at 37° C. in 24 hours.

The Canton-Hankow Railway

Four years have been set as the goal for completion of the 700 mile long Canton-Hankow Railway, the Ministry of Railways announces. This will be occupied in bridging the gap between Chiuchow, in Kuantung Province, and Chuchow, in Hunan.

The Ministry also revealed that discussion has been re-opened for constructing the projected Nanking-Hunan Railway, cutting across the middle south from the national capital to Changsha, a venture estimated in 1914 to involve an expenditure of $400,000,000.

The Canton-Hankow Railway, which will connect two of the nation's greatest centers of trade, is now two-thirds completed. One section is known as the Siang Yueh railway and the other as the Hunan-Hopeh line.

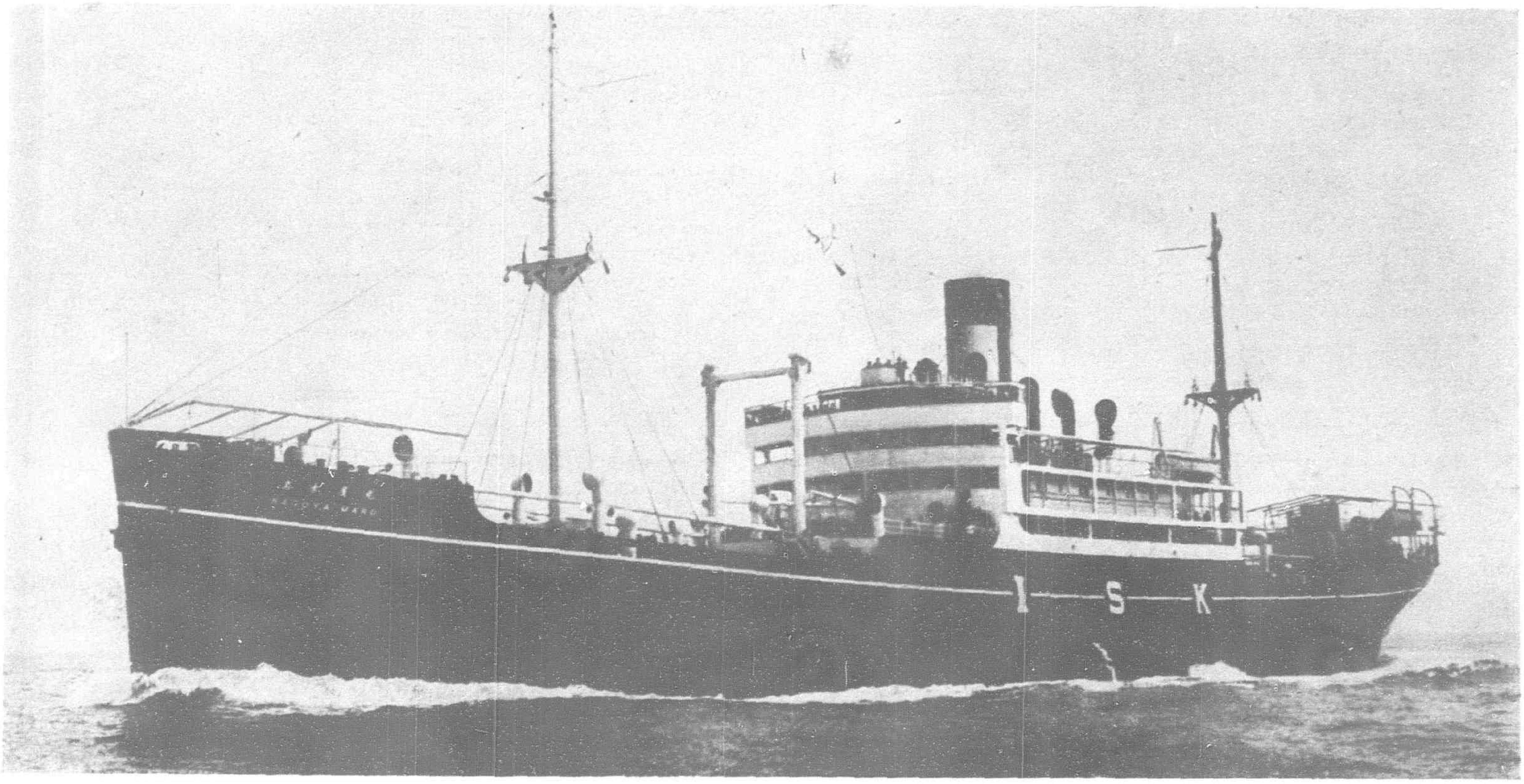
Surveying has now begun, impetus to the fresh start having been given by a loan of £1,500,000 with the British Boxer Indemnity Fund as security. Mr. Ling Hang-shung, who built many stretches of the Lunghai Railway, left this city a few days ago to take charge of the work. British interests will supply the material.

That the time estimate has been placed at four years is due, say Ministry officials, to the mountainous country that must be traversed. Much of the road will have to be blasted.

The projected Nanking-Hunan Railway, for which a contract made with British interests in 1914 is still valid though revision will be necessary, will be slightly shorter than the north-south line and will follow the course of Yangtze River in most part.

Interest in it has been revived by the application by a group of Chinese for permission to construct a line through Wuhu. It is a small venture and would represent an outlay of approximately $1,000,000. Its primary purpose would be to bring rice from the Wuhu country to the river.

Being in the neighborhood of Changsha, the line would necessarily follow the course plotted for the Nanking-Hunan roadbed. One factor is holding up the granting of permission. The small line will be of narrow-guage and its equipment as well as roadbed will be practically useless later for amalgamation purposes when the through line is built.



The s.s. "Nagoya Maru" on Trial Run

S.S. "Nagoya Maru"

Japan's First Pulverized Fuel Burning Ship is Equipped with Bauer-Wach's Exhaust Steam Turbine

By Y. TAJI, M.Eng., M.I.N.A.,M.I.Mar.E.

THE s.s. *Nagoya Maru* was built in the Mitsubishi Nagasaki Shipyard to the order of Messrs. Ishiwara Sangyo Kaisha for service between Japan, Java and Singapore, and is the first passenger liner equipped with pulverized fuel burning installation and a reciprocating steam engine with Bauer-Wach's exhaust turbine.

Strong arguments have been raised by the writer for some years for the adoption and development of the pulverized fuel burning system for Japanese boats, particularly to improve the efficiency of older steamships, of which Japan has too many in number. He presented a paper entitled "Application of Pulverized Fuel for Marine Boilers" to the Society of Naval Architects of Japan, 1928, but the majority of Japanese marine engineers, shipbuilders and owners were unwilling to adopt the suggestion and the matter appeared to have been overlooked even in leading shipyards. Under such circumstance, Messrs. Ishiwara Sangyo Kaisha took the matter up quite boldly and independently, and decided to build two fundamentally new ships equipped with this system and to compete with the ships of other companies which then were under serious competition for the South Seas trade.

Indeed, it is admirable that this company has courageously adopted this new system in the face of hesitating shipowners and builders, and now having seen these ships built, Japanese engineers and naval architects can make a thorough study of the pulverized fuel system applied to marine purposes, and for this step the thanks and respect of those interested in the development of marine engineering in Japan are due to the company concerned.

Leading Particulars and principal characteristics of the vessel are as follows :—

Length over-all		422-ft. 6-in.
Length between perpendiculars		405-ft. 0-in.
Breadth moulded		55-ft. 6-in.
Depth moulded		32-ft. 6-in.
Full load draught		26-ft. 0-in.
Gross tonnage		6,049 tons.
Dead weight capacity		8,800 tons.
Cargo capacity, in cb. ft.	grain.	425,000
	bale.	395,000
Maximum speed		16.5 knots

Main engine :—

One set of reciprocating steam engine with a Bauer-Wach's exhaust steam turbine.

Main boilers :—

Three sets of marine cylindrical boilers with Clarke, Chapman's forced draught pulverized fuel burning system.

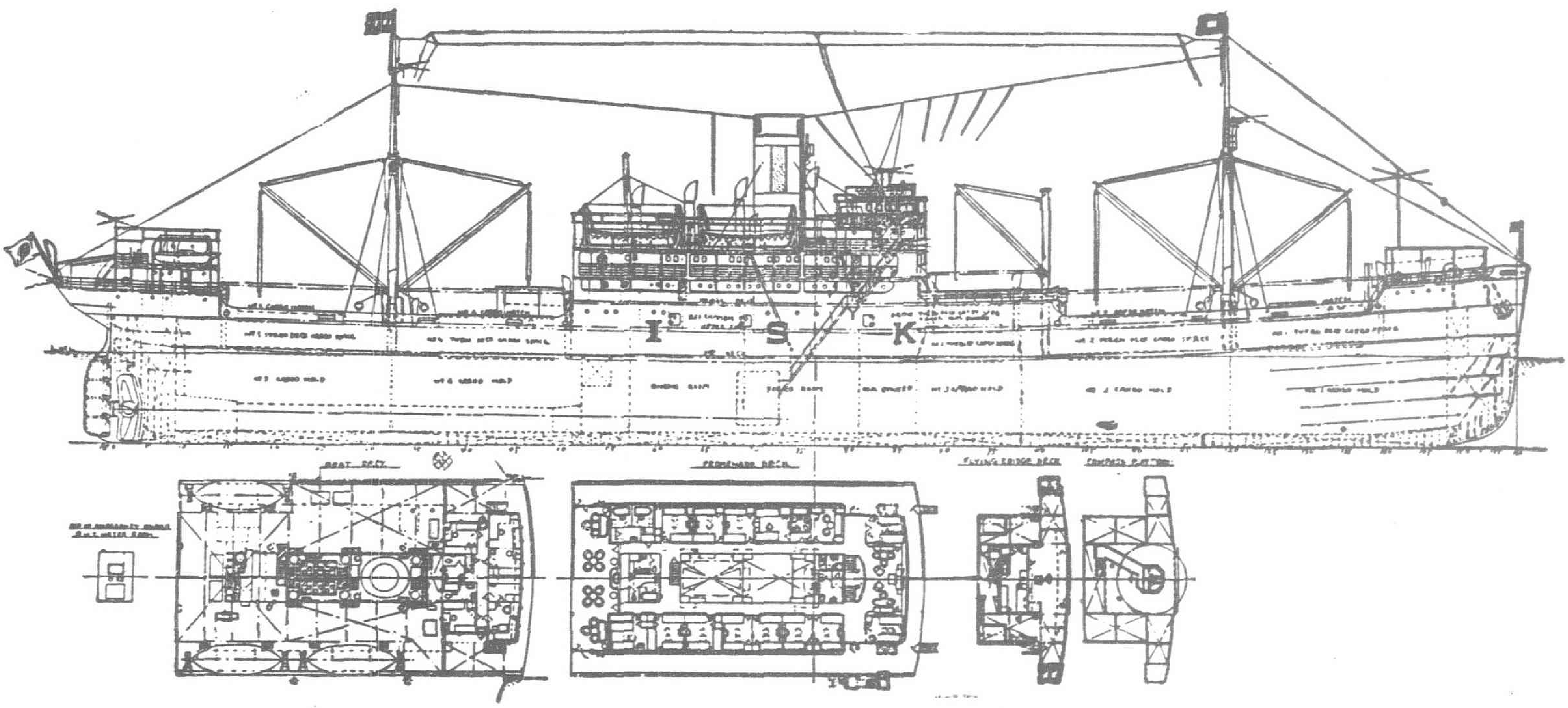
Number of passengers :—

En suite room	2
First class	31
Second class	26
Total	59
Ship's complement	79

Classification :—

✠100A1 and L.M.C. by Lloyds' Register. "First Class Ocean Service Vessel" by the Imperial Japanese Government.

The vessel is of the most up-to-date design, not only in the propelling machinery including the pulverized fuel system and exhaust turbine, but also in special arrangements for the passengers', officers' and crew's accommodations as well as outstanding cargo facilities to ensure the most efficient and comfortable service in tropical districts.



General arrangement of the s.s. "Nagoya Maru"

General Arrangement

The vessel has two upright masts, twin posts, one funnel, two tiers of continuous decks extending over the whole length, a forecastle, a poop, a bridge deck, a promenade deck, a boat deck, a navigation bridge and an aft boat deck. The stem is of round flexible type and the stern is of elliptical type fitted with a Star-Contra rudder.

The hull is subdivided into eight watertight compartments by seven transverse bulkheads, the fore and aft peak tanks being for fresh water, and the double bottom extends over the whole length of ship and is utilized for the stowage of feed water, fresh water and ballast water. Two tiers of continuous decks, watertight subdivisions of the hull and double bottom ensure the safety of the ship at sea and are in strict compliance with the International Conventions.

On the forward part of the boat deck are the Captain's day room and a bedroom, a wireless telegraphy room adjoining an operator's room, officers rooms, a bath-room and lavatories, whilst the remaining large area is utilized for a promenade for first class passengers and is sheltered from the sun's heat and heavy tropic showers by an awning covering the entire space.

The promenade deck is allotted for the first class passengers' accommodation with a smoking-room at the forward part, a verandah at the aft end, a grand staircase, en suite rooms and state rooms amidships. On the front of bridge deck are arranged a large first class dining-saloon and a main entrance hall with a grand staircase at center, whilst abaft them are a purser's room, a doctor's room, a chief engineer's room, officer's and engineer's rooms, a mess-room, and an European galley.

On the upper deck amidships are oilers', firemen's and mechanics' rooms, a mess-room, cold stores, provisions rooms, and a Japanese galley.

In the forecastle are crew's compartments, a mess-room, a lamp room, and paint room, whilst the poop is utilized for second class state rooms, a bath-room, stewards' rooms, and a steering gear room. On the poop deck are a second class dining-room, a pantry and lavatories. Benches are fitted to both sides of the deck house and the space is also utilized as a promenade for second class passengers. On the aft boat deck are a hospital and a lavatory.

Passengers' Accommodation

Vessels hitherto operated on Japan-South Seas route having been not specially designed for tropical service, various complaints have been made by passengers, ship's officers and men. In this ship, special precautions have been taken for various arrangements, particularly for passengers', officers' and crew's accommodations as well as for lighting, ventilation and cooling of the ship.

The first class accommodation comprises en suite rooms with a sitting room, a bedroom, a bath and toilet room; family rooms, and state rooms for two persons and these occupy a main space amidships, all rooms being decorated and furnished in very modern attractive style under well harmonized color schemes. At the center of the entrance hall is a grand stairway, and on the tops of main hand-rail stanchions of the staircase ornamental gilt "Satihoko" (inverted dragon-like fish) are placed, these being imitations of the roof corner decoration of Nagoya Castle, from which the name of the ship is derived. On the front wall above the staircase an oil painting of Sinpankiri Iron Mine in center, and pictures of Nagoya Castle, Japan Rhein, and Johore are arranged.

The first class dining-saloon is surrounded by light greenish walls, and is provided with various sizes of tables, for two, four, five and six persons, with leather-lined chairs of the same color as the walls, avoiding heavy elaborate decoration and furniture. The first class smoking-room is fitted with large rectangular French windows at the front, the walls being panelled with rare wood, having wall lamps with elegantly stained glass shades in French style. This room is provided with various equipment for amusements such as a radio apparatus, a gramphonola, Mah Jong tables, card tables, and chess boards.

The verandah is large and inviting, having a niche with beautiful glass mosaic and showing an onyx marble flower pedestal at center, whilst the walls are painted in a suitable color scheme for tropical climate.

All decoration and color schemes for private and public rooms are in elegant and simple design and heavy elaborate effects are carefully avoided, so as to give a refreshing feeling to passengers in tropical districts.

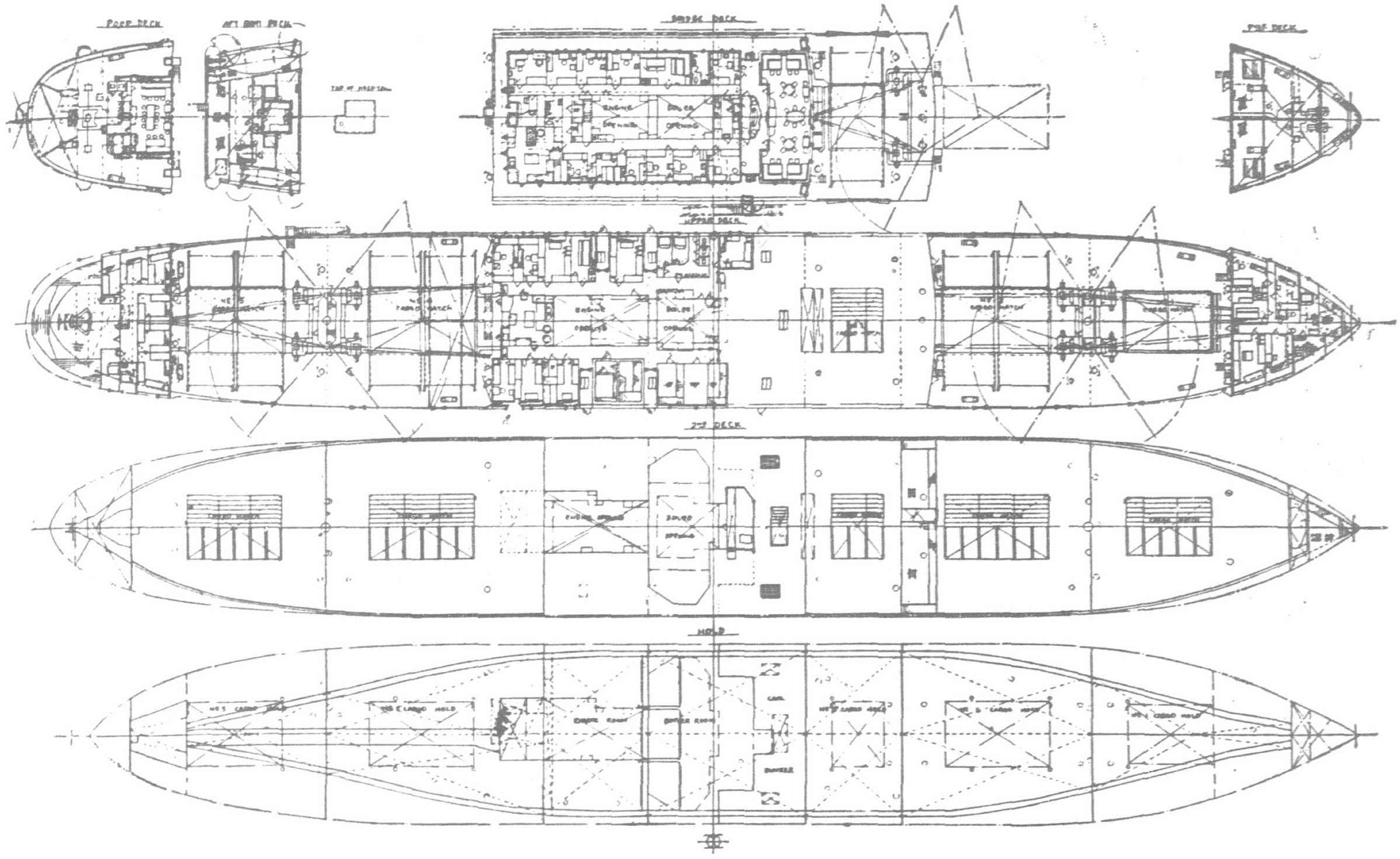
Cargo Facilities

The vessel being not only for carrying passengers, but also having a dead weight capacity of 8,800 tons, special care has been taken for cargo facilities. There are five large hatchways with six 6 ton, two 10 ton and two 3 ton derricks, whilst two steam winches are provided for each hatchway, all the winches being made in Japan.

It is worthy to note that five hatchways on the upper deck and bridge deck are fitted with Mitsubishi-Macanking steel hatch covers. The adoption of this type of hatch cover to all the large hatchways on the exposed decks is not only the first enterprise, but is also very seldom seen even in ships of other countries.

Various Appliances

Life-saving appliances comprise three 26-ft. life-boats under Columbus davits, one 24-ft. life-boat under Mitsubishi mechanical



Showing decks arrangement of s.s. "Nagoya Maru"

turning davits and one 18-ft. Japanese junk, all being in compliance with the International Convention for the Safety at Sea. Emergency lamps are fitted in vicinity of life-boats.

All cargo holds and some of stores are fitted with electric automatic fire alarms manufactured by the Mitsubishi Electric Engineering Co., Ltd.

Further, Amag-Hilpart's submergible S.O.S. pumps, 14 kw. Ikegai emergency dynamo, line throwers for rescue work, 1 kw. Adachi's wireless telegraphy apparatus, a Telefunken radio direction finder, and Brown's quadrant type steering gear are installed. Cold storage being also very important for tropical service a large refrigerating room comprising a meat room, a vegetable room and a preparation room is arranged, and a brine circulation Ammonia compression type refrigerating machine is provided.

Special precaution is also taken for ventilation, lighting and sanitary arrangements, as mentioned before; fresh water, hot and cold, being supplied to all first class state-rooms, and double-walled Venetian baths being fitted to the captain's and special bath-rooms.

Propelling Machinery

The adoption of pulverized fuel burning system and exhaust turbine combined with a reciprocating steam engine and marine cylindrical boilers in a brand new ship is an unprecedented event, epoch-making in the history of Japanese marine engineering.

There are many types of pulverized fuel systems which hitherto have been introduced, but Clarke, Chapman's system is adopted in this ship, as this system has not only many advantages in design and construction, but also is considered most suitable for Japanese coal with a high percentage of moisture content.

In the present system, coal is carried to a crusher by automatic conveyers and crushed coal is delivered to coal-chutes on top of "Resolutor" pulverizers and immediately is carried to pulverizing chambers. Coal of reduced size being pulverized there by impact of beaters. It is conveyed to boiler furnaces together with heated air through Woodeson's patent burners, and then perfect combustion is effected. Ashes deposited in combustion chambers are blown off and discharged overboard by Woodeson's ash ejectors, thus a considerable economy in coal consumption and labor is realized, not only due to low cost of inferior coal, but also from the compact and efficient pulverizing installation.

The particulars of the main engine, boilers, and auxiliaries are as follows :—

(*a*) MAIN ENGINE.—Is one set of the latest triple expansion steam engine with a h.p. cylinder of 25.5-in. bore, a i.p. cylinder of 41.5-in. and a l.p. cylinder of 69-in. and a stroke of 51-in., developing normally 4,300 i.h.p. at 86 r.p.m. The engine is fitted with feed pumps, bilge pumps and a Mitsubishi-Bauer-Wach's exhaust steam turbine with seven stages and double reduction gearing, the first reduction wheel being coupled to Vulcan gear.

(*b*) MAIN BOILERS.—There are three sets of marine cylindrical boilers of 15-ft. 6-in. in diameter and 12-ft. 6-in. in length with a working pressure of 225 lb. per sq. in. each boiler being fitted with a powerful super-heater and air pre-heater.

(*c*) PULVERIZED FUEL INSTALLATION.—Comprises three sets of Clarke, Chapman's Resolutor type pulverizer with a capacity of one ton per hour, primary air fan and beaters being driven by a high-speed single cylinder steam engine at 1,450 r.p.m.

(*d*) VARIOUS AUXILIARY MACHINERY.

2—15 kw. steam driven electric dynamos.

1—air pump of Weir's Palagon type.

1—steam driven centrifugal circulating water pump.

2—steam driven Munford lubricating oil pumps.

2—feed pumps of the same type

2—steam driven Mitsubishi forced draught fans for secondary air.

1—Donkey boiler of Cochran type with a diameter of 6-ft. 6-in., a height of 15-ft. 0-in. and a normal working pressure at 100 lb. per sq. in.

1—steam driven coal elevator with a lifting capacity of 10 tons per hour.

1—steam driven coal crusher of 10 tons per hour.

1—Woodeson's patent ash ejector.

1—steam driven ash hoist., etc.

Engineering Notes

INDUSTRIAL

NEW CEMENT FACTORY.—In order to meet the demand for cement for roadmaking in Kweichow, China, the local headquarters of the 4th Group Army, has formulated plans for the construction of a cement factory at a suitable site in Kweichow province. An engineer from Canton will proceed to survey the mineral deposits of Kweichow, which are reported to be very rich. The proposed Kweichow cement works will be built at the cost of $5,000,000 ; and when completed it will have a daily output of 1,000 barrels.

ELECTRICAL

ENLARGING PLANT.—The plant for the manufacture of telegraph instruments, established by the Chinese Ministry of Communications at Shanghai, is to be enlarged to include the manufacture of telephone apparatus and instruments. In view of the fact that supplies are being obtained from abroad at exceedingly high prices, owing to unfavorable rates of exchange, the Ministry has decided to start making the apparatus it needs.

CHINESE POWER PLANT.—It is reported that detailed plans and estimates for the construction of a hydro-electric power station at Ichang, drafted by engineers of the National Reconstruction Commission and the Yangtze River Conservancy Commission, have been submitted to the Executive Yuan for consideration. The station is estimated to cost $40,000,000 and will require three years for erection. It will have a generating capacity of 20,000 kilowatts, sufficient for the demands of an area extending over a wide radius

DEVELOPMENTS IN JAPAN.—By the construction of a reservoir costing Y.10,000,000 the Daido Power Co. will be able to increase the output of its Kisogawa power station by 50,000 kw. Official permission has been granted to the Fuji Power Co. for the erection of a Y.5,000,000 power station at Kawayuyama. Included in the I.G.R.'s proposed schemes for the year 1932-33 is the allocation of Y.10,000,000 to electrical works, the largest item being the building of the Shinano River power station, the cost of which is estimated at Y.4,000,000. About Y.1,000,000 is to be spent on a transmission line to the Shimizu Pass, while another important scheme provides for a 70 km. transmission line between Atami and Numadzu. When, in 1927, the I.G.R. decided to erect their own power station to serve the electrified lines an order for two 20,000 kw. turbo-alternator sets was placed with the British Thomson-Houston Co., Ltd. One of these sets is capable of sustaining an overload of 25,000 kw., a peak load of 30,000 kw., and a momentary overload up to 40,000 kw. The turbine is of the two-cylinder type, has 25 stages, and is designed for normal steam conditions of 25 kg. per sq. cm. and a total temperature of 375 deg. C. at the stop valve.

MINING

CLOSES ANTIMONY EXCHANGE.—The Hunan Provincial Government in China has decided to abolish the local Antimony Exchange and establish in its stead a joint trading office to handle sales of the output of all antimony mines in Hunan. It is proposed to levy a 10 per cent export sales-tax on the metal to provide funds for the upkeep of the organization.

CHINESE TUNGSTEN.—Technical experts have been despatched by the Ministry of Industry to Kiangsi to investigate the possibilities of a resumption of tungsten mining. Despite the rich tungsten deposits in southern Kiangsi, which are estimated to represent 60 per cent of the world supply, the prevalence of banditry has arrested development of the industry. With the clearance of large areas from bandits, however, the Ministry is planning to exploit the mines to meet the home and foreign demand for tungsten.

AVIATION

BUYING PLANES.—In view of the insufficient number of machines for use on the North-western Airway in China, the Eurasia Aviation Corporation has decided to purchase four additional planes. An order has been cabled to the Junkers Factory in Germany.

RESTRICTS AIRCRAFT BUYING.—By order of the Chinese Executive Yuan, no military planes may be purchased by individual military units, local governmental organs, or any other bodies. This prohibition is designed to unify the control of military aviation affairs under the Aviation Administration of the Ministry of War. Only commercial and training machines may be purchased by local organs, and then only when sanctioned by the proper authorities from whom permits may be obtained. It is also ordered that no aviation organ or air corps may be formed by any military unit without prior authorization by the Government.

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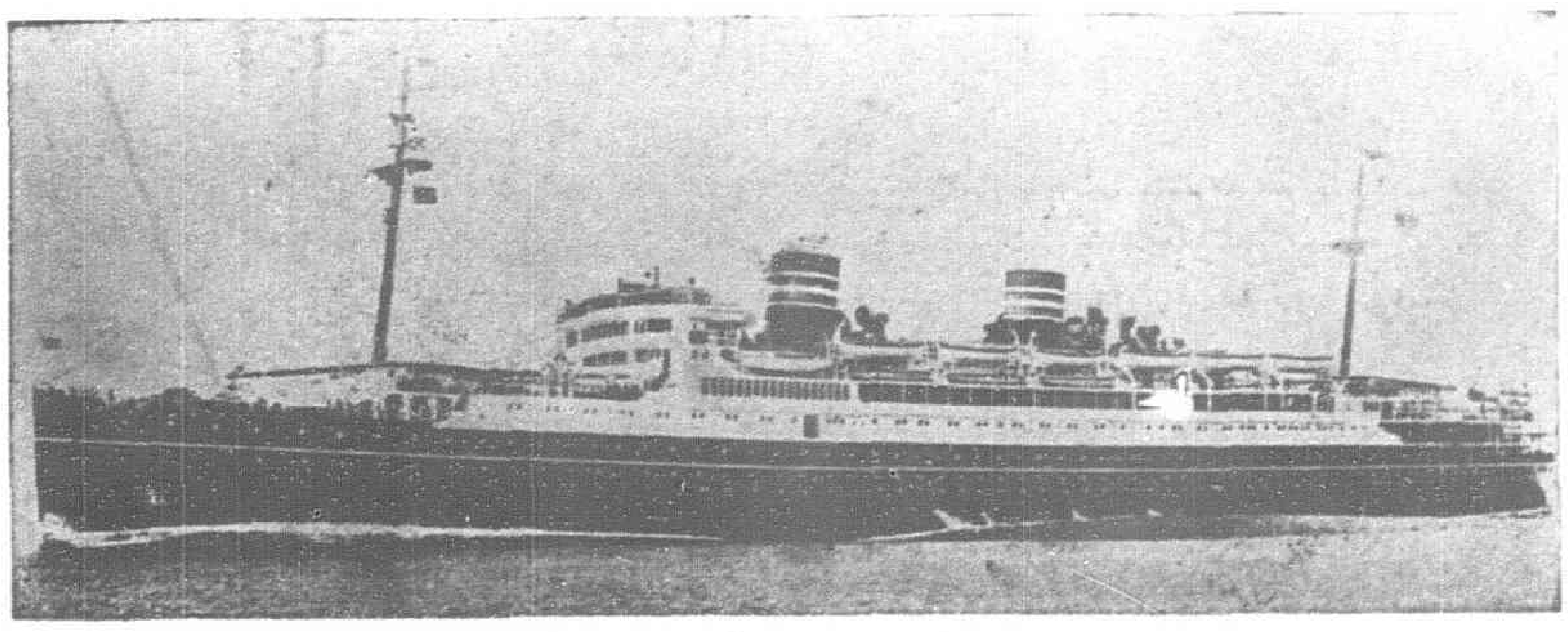

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